



## AT OBSTACLES

FOR MULTIPLE OBSTACLES - SPECIFY VAR. IN 12'-6" INCREMENTS.

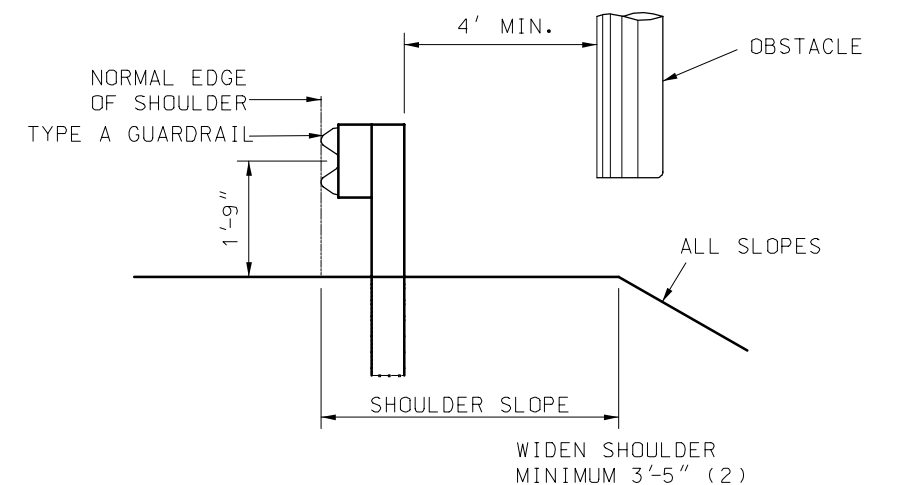
## GUARDRAIL LOCATIONS

## LEGEND

 GUARDRAIL  
 OBSTACLE



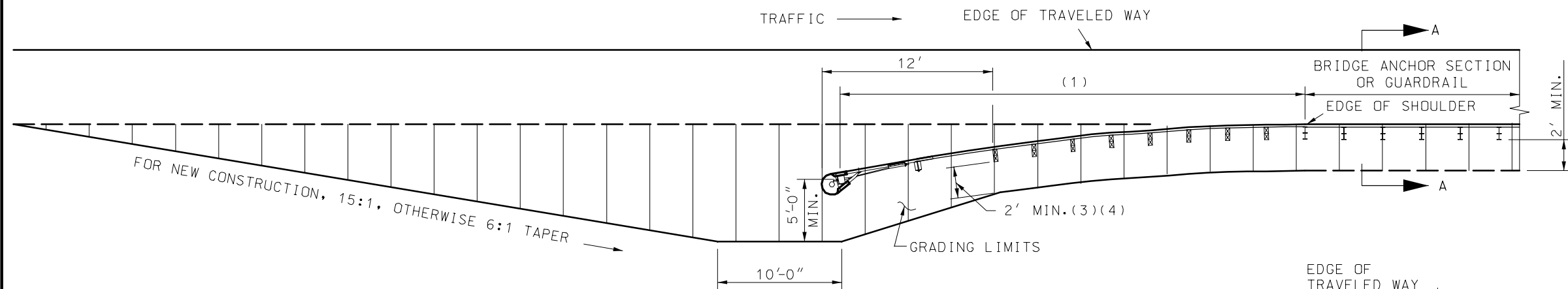
- (1) APPROVED TYPE A CRASHWORTHY END TERMINAL.
- (2) SHOULDER WIDENING SHALL CONSIST OF EMBANKMENT MATERIAL COMPACTED IN ACCORDANCE WITH SECTION 203.4 OF THE STANDARD SPECIFICATIONS.
- (3) WHEN GUARDRAIL IS CONSTRUCTED OVER CURBS, THE CURBS SHALL BE CONSTRUCTED AS SHOWN.



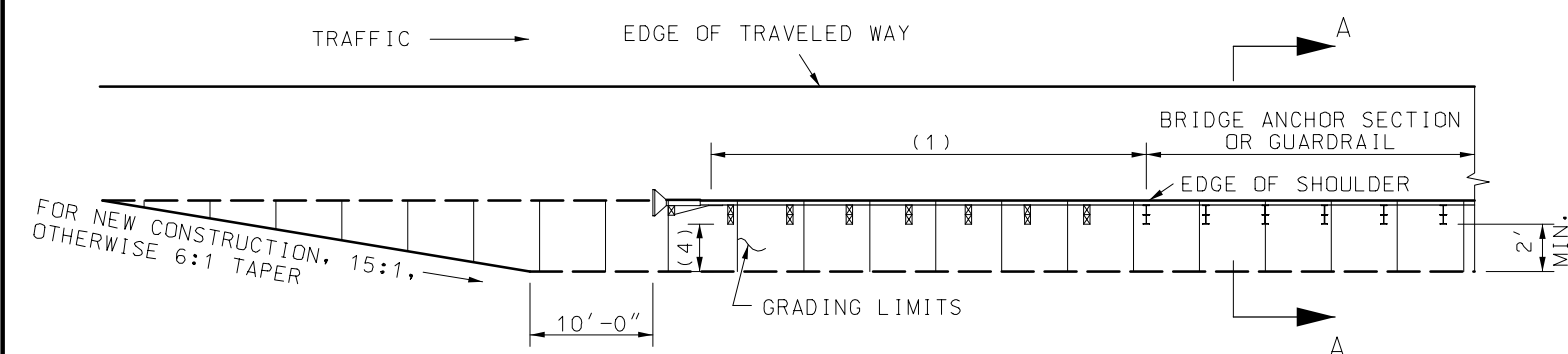
## LOCATION OTHER THAN C MEDIAN

## LATERAL PLACEMENT OF GUARDRAIL FOR SHOULDER INSTALLATION

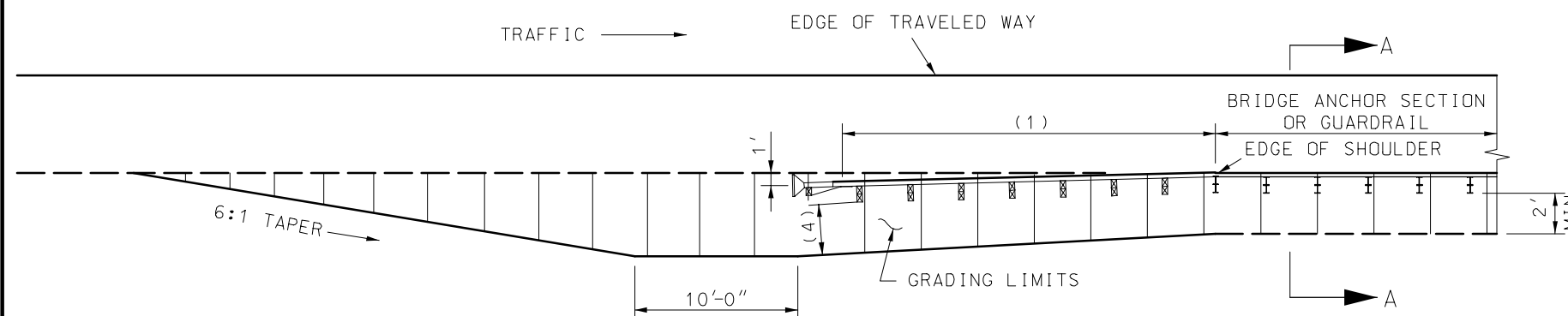
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
	GUARDRAIL		
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	1 17



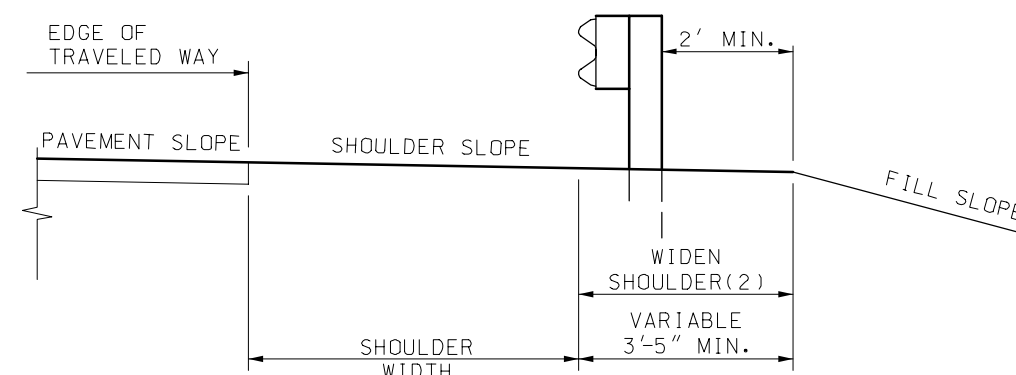
**GRADING LIMITS FOR TYPE A FLARED CRASHWORTHY END TERMINAL**



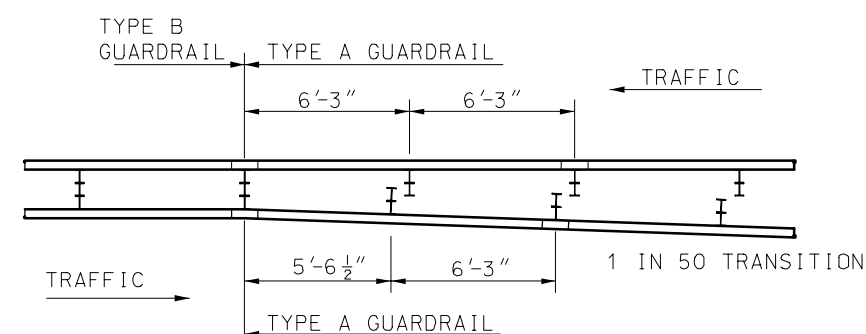
**GRADING LIMITS FOR TYPE A NON-FLARED CRASHWORTHY END TERMINAL**



**GRADING LIMITS FOR TYPE A NON-FLARED OFFSET CRASHWORTHY END TERMINAL**



**SECTION A-A**



**DETAIL FOR TRANSITIONING  
BETWEEN TYPE A AND TYPE B GUARDRAIL**

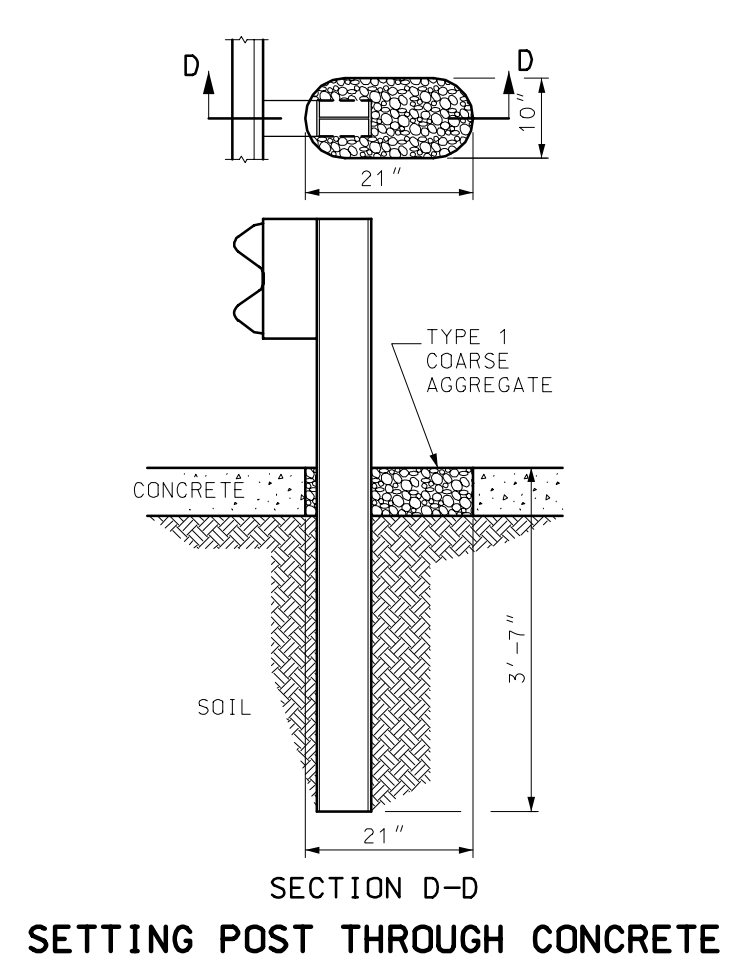
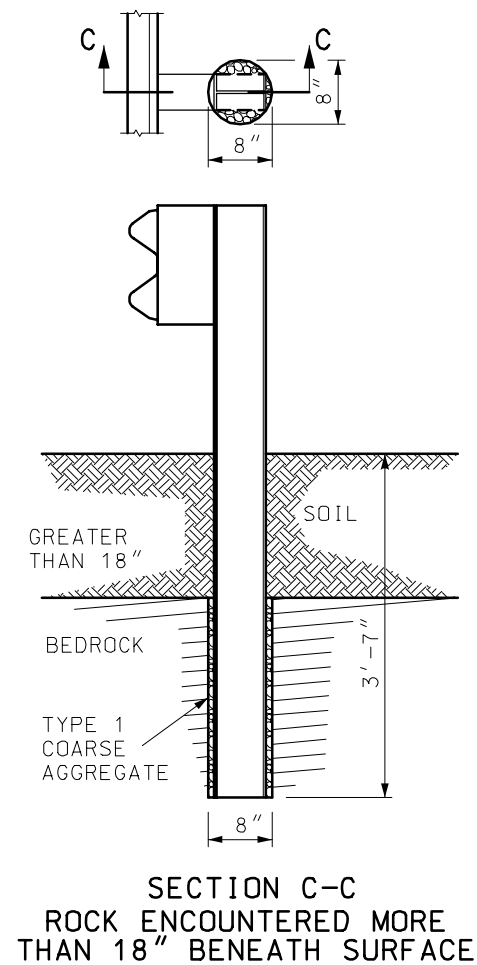
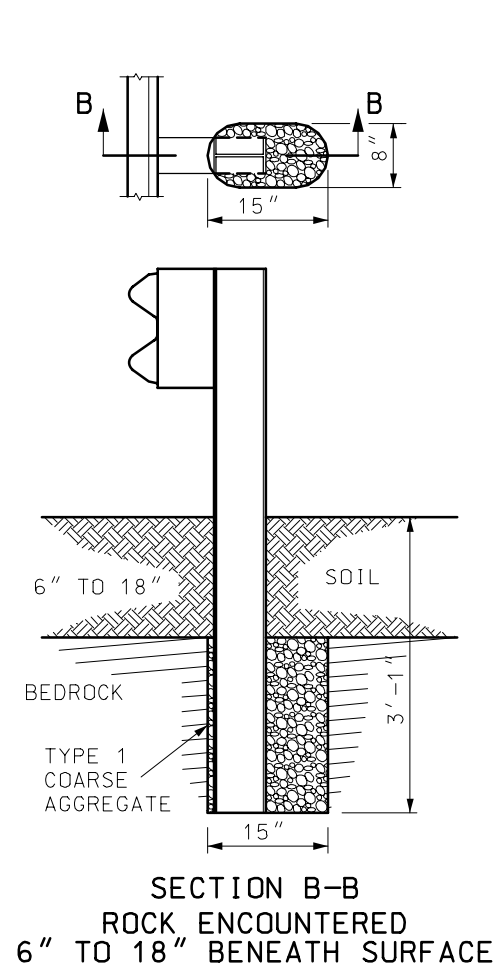
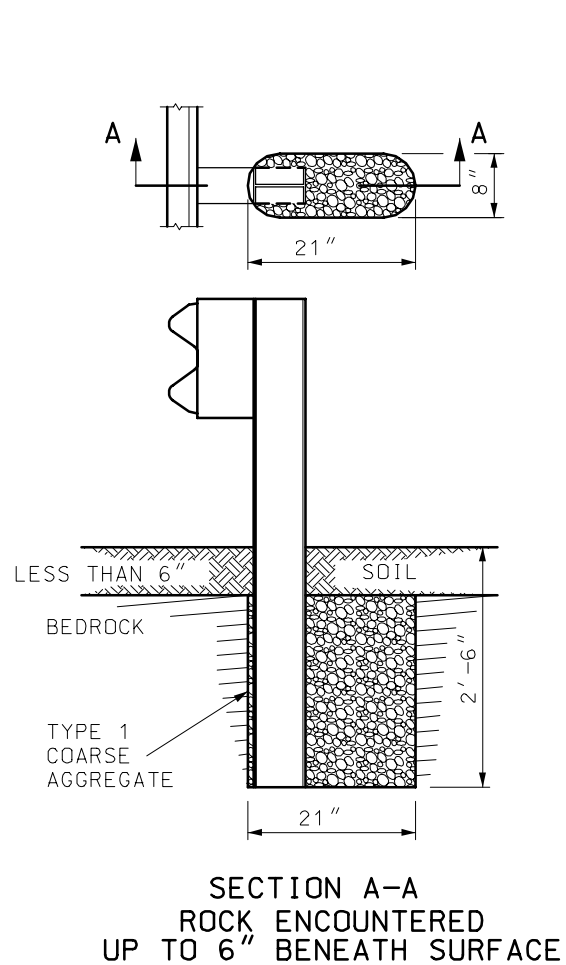
**GENERAL NOTES:**

THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH APPROVED SHOP DRAWINGS OF THE APPROVED CRASHWORTHY END TERMINAL.

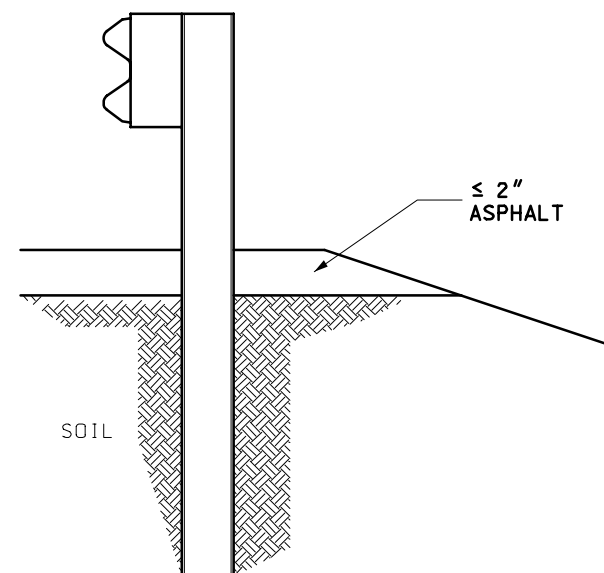
END ANCHORS SHALL BE INSTALLED ON ENDS OF GUARDRAIL RUNS WHERE CRASHWORTHY END TERMINAL IS NOT REQUIRED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
<b>GUARDRAIL</b>			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	2/17

- (1) APPROVED TYPE A CRASHWORTHY END TERMINAL.
- (2) SHOULDER WIDENING SHALL CONSIST OF EMBANKMENT MATERIAL COMPACTED IN ACCORDANCE WITH SECTION 203.4 OF THE STANDARD SPECIFICATIONS.
- (3) THE SLOPE SHOULD BREAK BEHIND THIRD POST.
- (4) AS PER MANUFACTURER'S SPECIFICATIONS, 2' MINIMUM. NO DIRECT PAY.



## SETTING POST IN SOLID ROCK

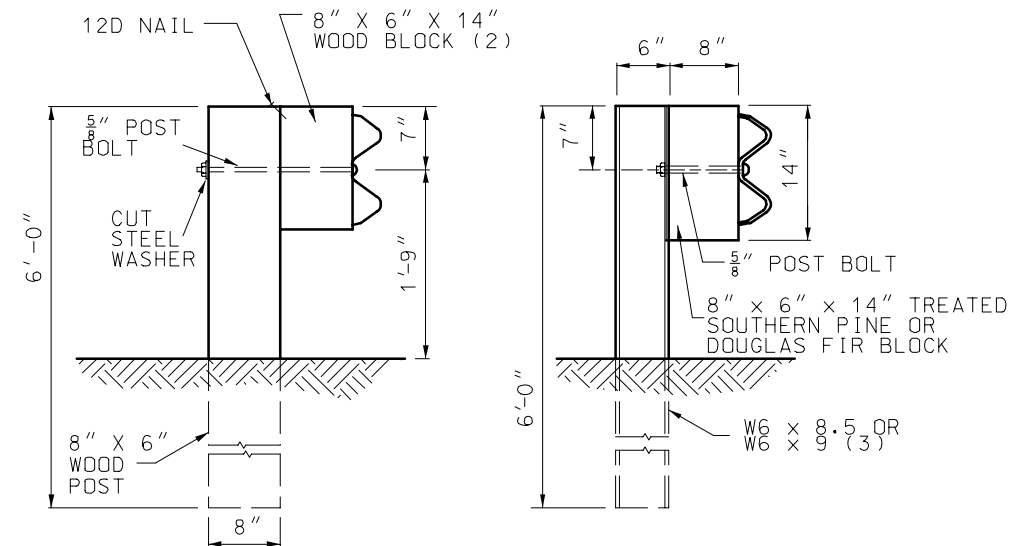


### GENERAL NOTES:

HOLES IN SOLID ROCK SHALL PROVIDE A DIAMETER OF NOT LESS THAN 4 INCHES GREATER THAN THE MAXIMUM TRANSVERSE DIMENSION OF THE POST SECTION.

POST MAY BE SHORTER WHERE PLACED IN 2 FEET OF SOLID ROCK. STEEL POSTS MAY BE FLAME OR SAW CUT. REPAIR OF CUT SHALL BE IN ACCORDANCE WITH SECTION 712 OF THE STANDARD SPECIFICATIONS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
<b>GUARDRAIL</b> <b>SETTING POST IN SOLID ROCK AND THROUGH CONCRETE OR ASPHALT</b>			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	3/17

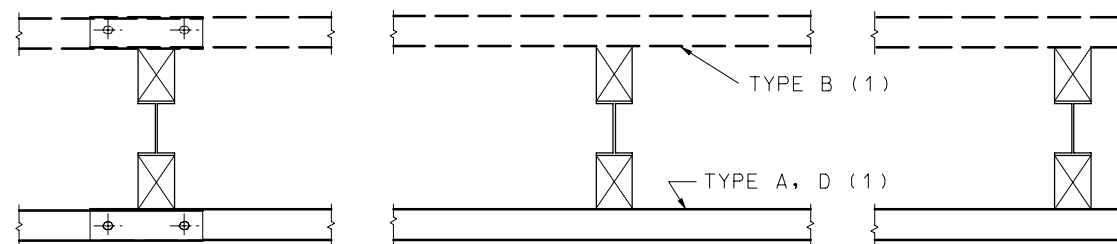


**WOOD POST AND  
WOOD OR PLASTIC BLOCK**

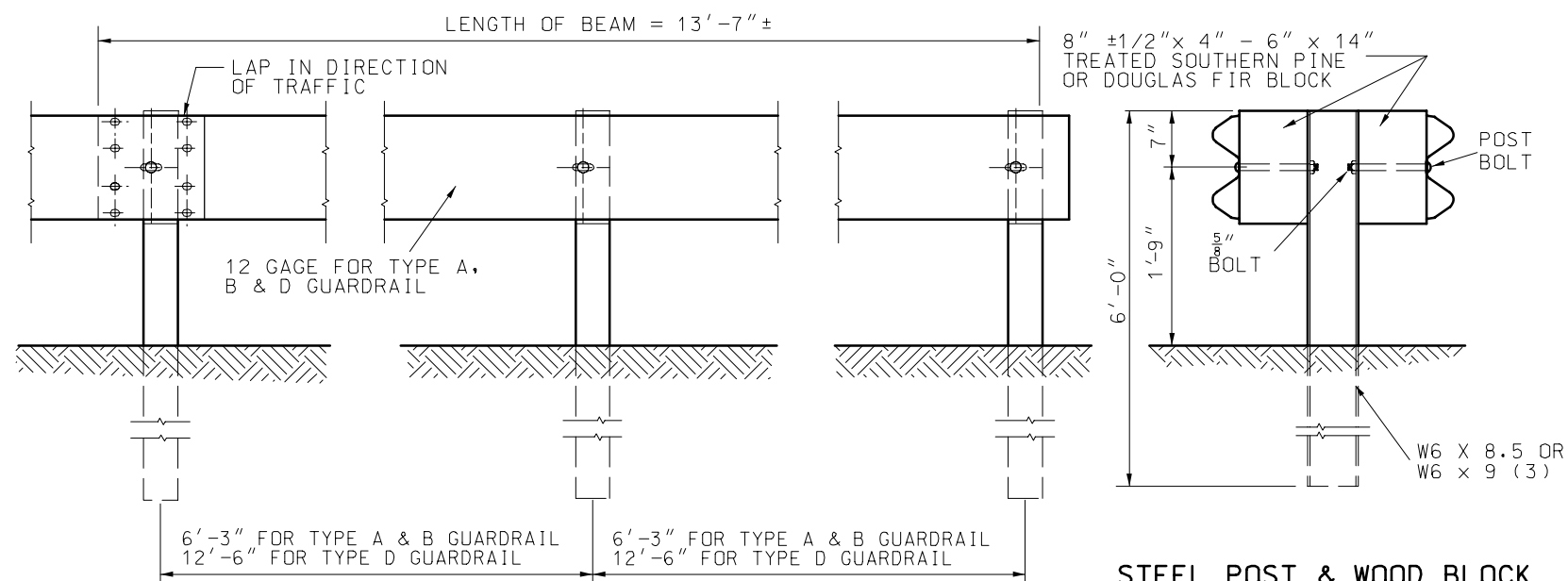
**STEEL POST AND  
WOOD OR PLASTIC BLOCK**

**TYPE A AND D GUARDRAIL**

- (1) END TREATMENT AS SPECIFIED ON PLANS.
- (2) AN ALTERNATE DESIGN, AN 8" X 4" X 14" WOOD BLOCK, MAY BE USED
- (3) THE CONTRACTOR MAY FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH SECTION 1040.



**PLAN**



**ELEVATION**

NOTE:  
FOR TYPE E GUARDRAIL AND TRANSITION  
DETAILS SEE SHEET 7 OF 15.

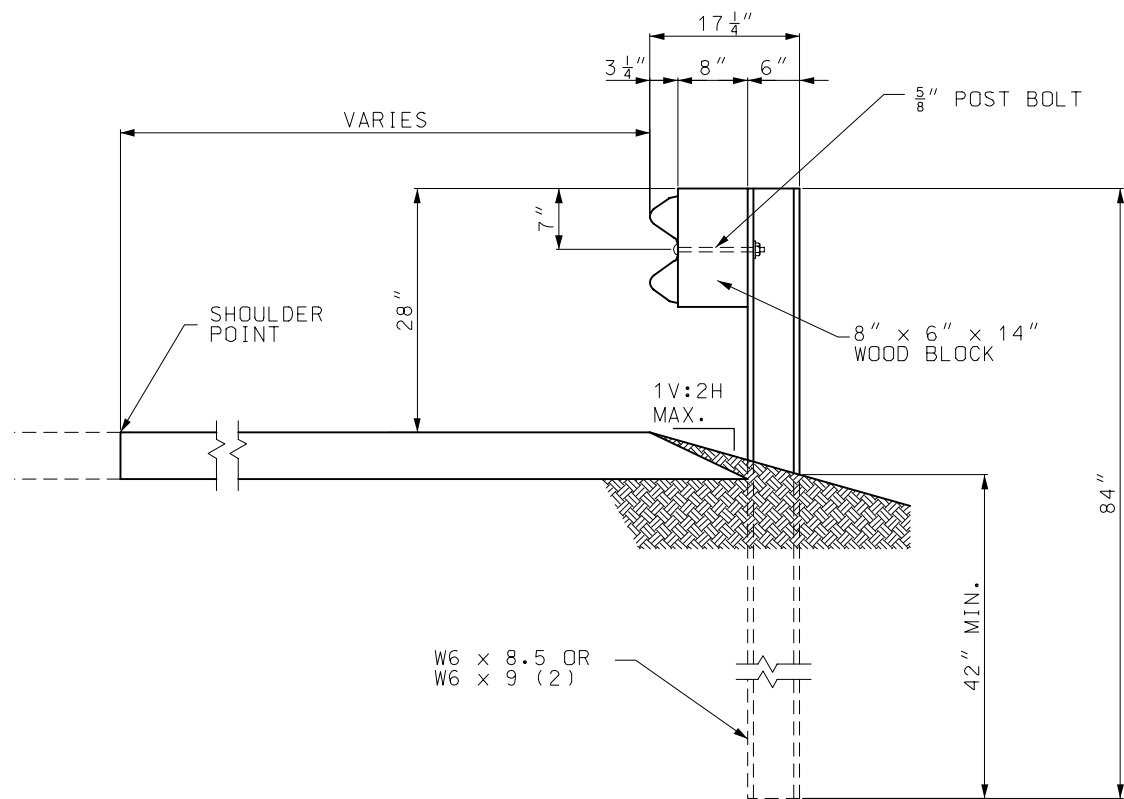
**TYPE B GUARDRAIL**

**GENERAL NOTES:**

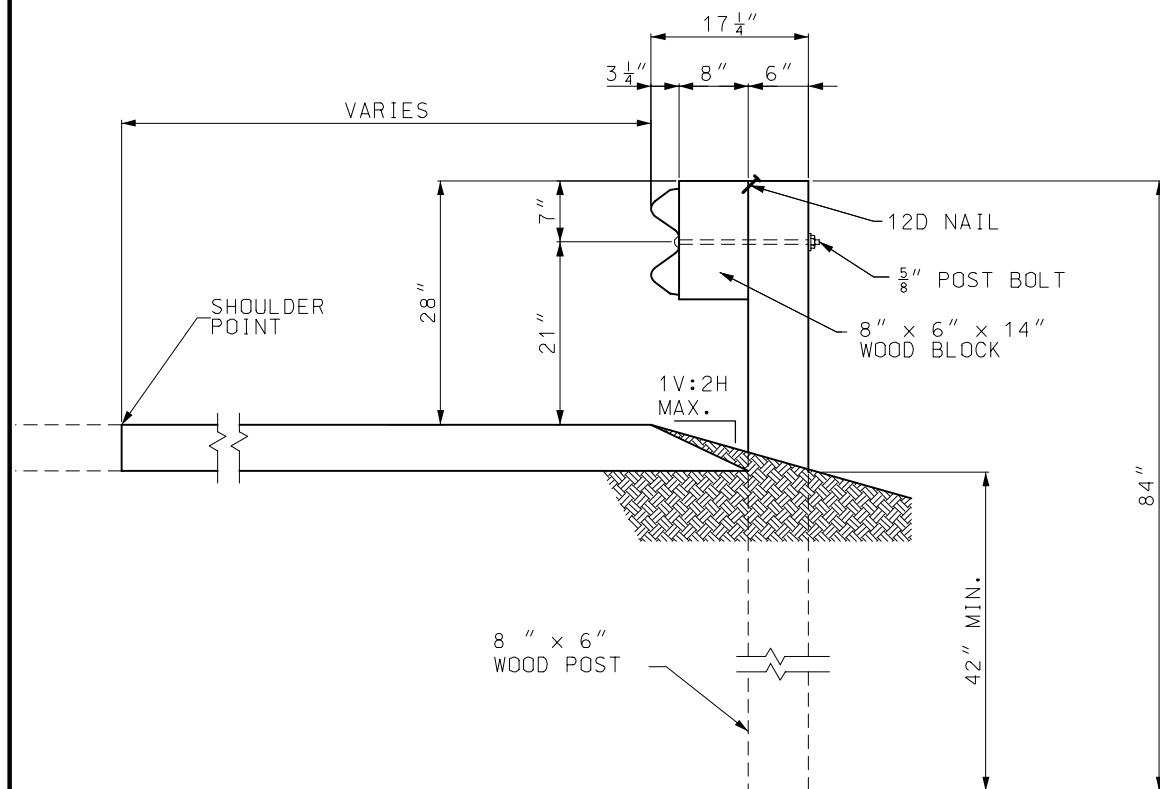
WASHERS SHALL BE OMITTED ON ALL CONNECTIONS ON TYPE A, B AND D GUARDRAIL.

ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE SHOWN.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
<b>GUARDRAIL TYPES A, B &amp; D</b>			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	4 17

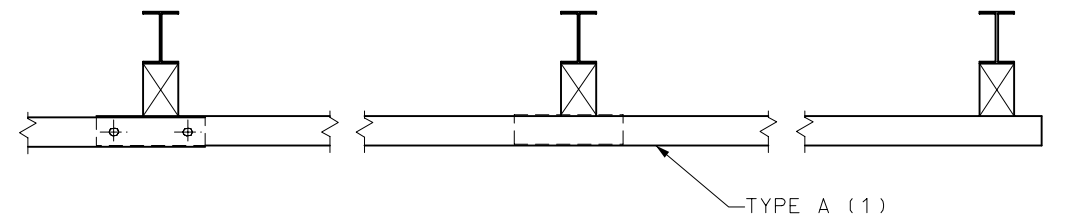


STEEL POST & WOOD BLOCK  
TYPICAL SECTION

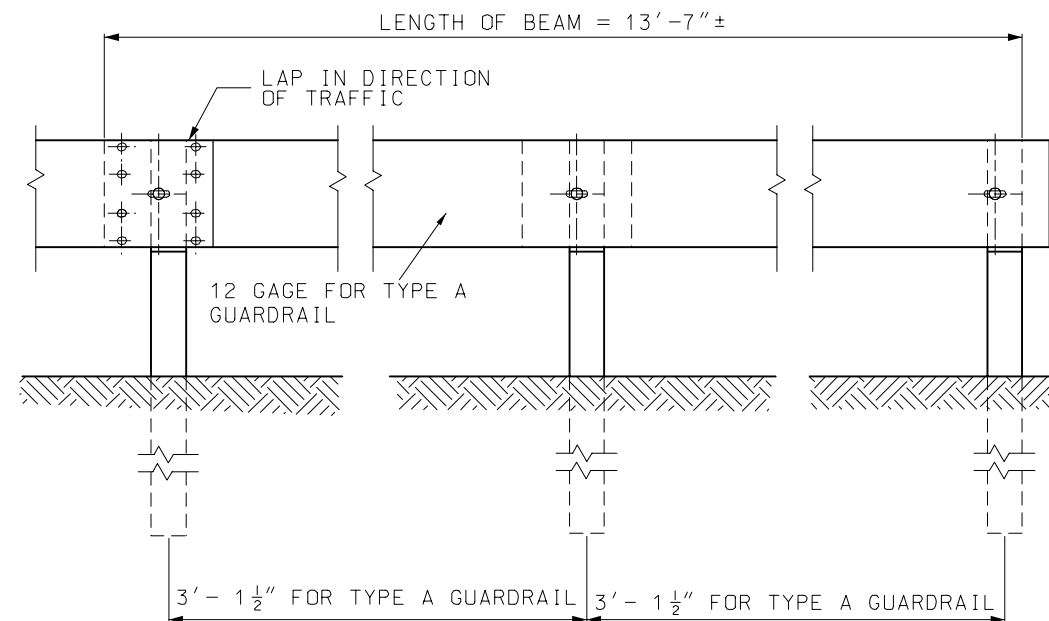


WOOD POST & BLOCK  
TYPICAL SECTION

NOTE:  
(1) END TREATMENT AS SPECIFIED ON PLANS  
(2) POST EMBEDDED A MINIMUM OF 42" IN SOIL.



PLAN



ELEVATION

GENERAL NOTES:

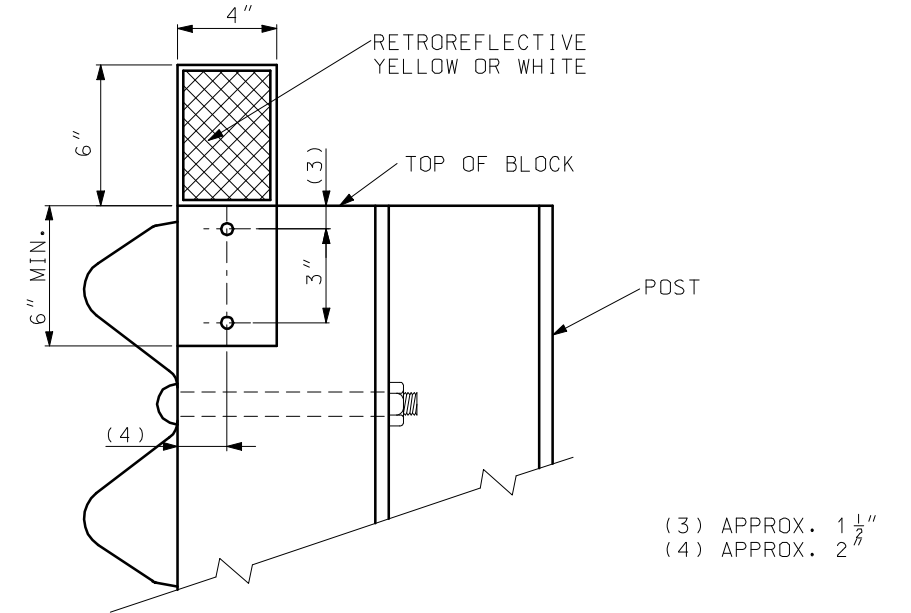
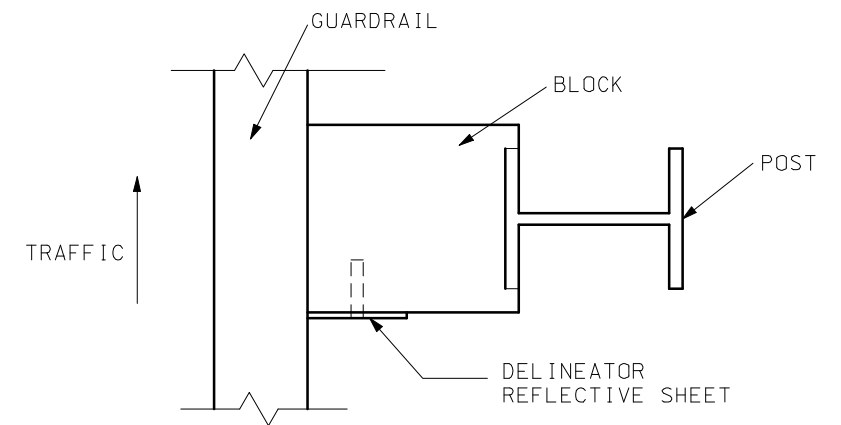
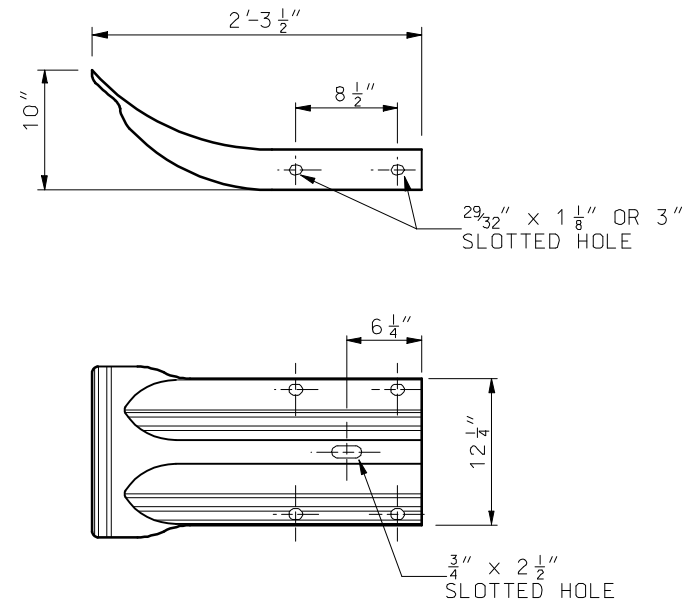
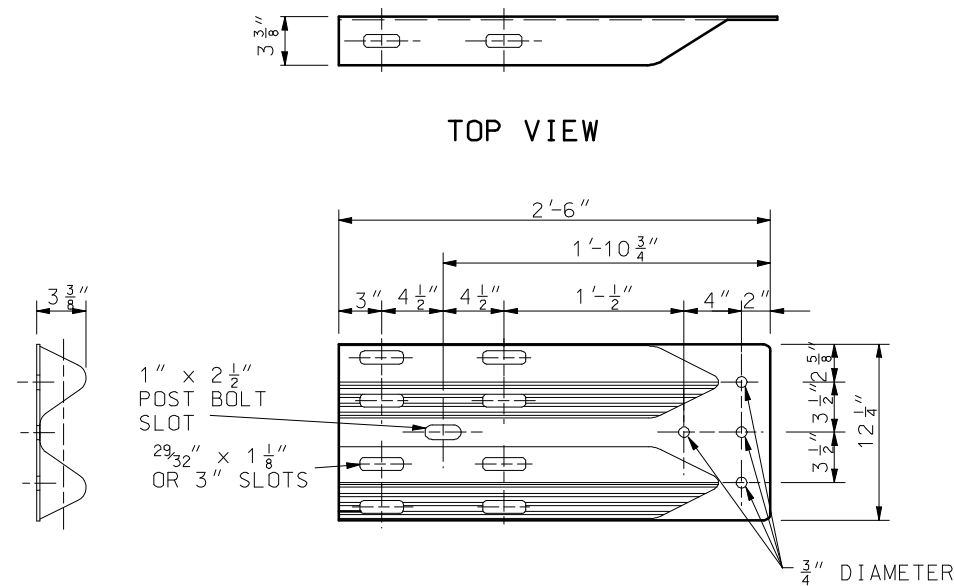
WASHERS SHALL BE OMITTED ON ALL CONNECTIONS ON TYPE A GUARDRAIL.

POST MAY BE WOOD OR STEEL WITH ONLY ONE MATERIAL ALLOWED WITHIN A SINGLE PROJECT, EXCEPT FOR END TREATMENTS.

ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE SHOWN.

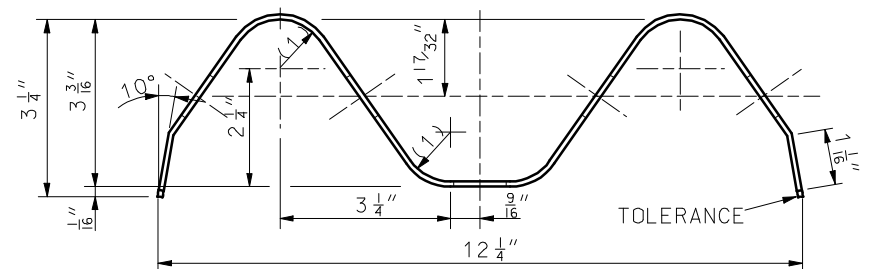
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
<p><b>GUARDRAIL</b> 7 FT. POST</p>			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	5/17





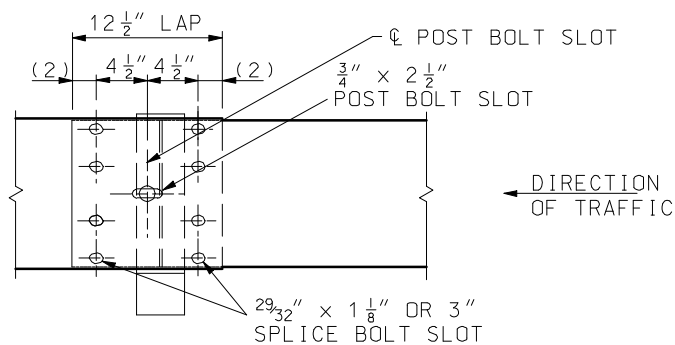
DELINEATORS SHALL BE AFFIXED WITH 2" (MIN.) LONG X 1/4" DIAMETER BOLTS OR SCREWS. THE DIAMETER OF THE BOLT'S OR SCREW'S HEAD SHALL BE TWICE THE DIAMETER OF THE HOLE, WITH A MINIMUM OF 1/2". WASHERS SHALL BE USED WITH THE BOLTS AND SHALL HAVE 1/2" DIAMETER HOLES.

## DELINEATORS ON NEW GUARDRAIL

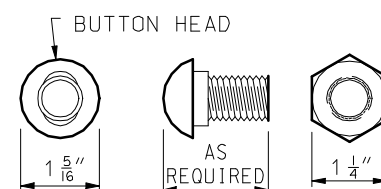


## SECTION THRU BEAM

- (1) 15/16" RADIUS  
(2) 2" (TOLERANCE +1 1/4", -1/4")

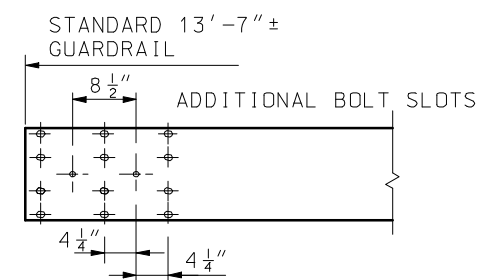


## BEAM SPLICE AT POST TYPE A, B AND D GUARDRAIL



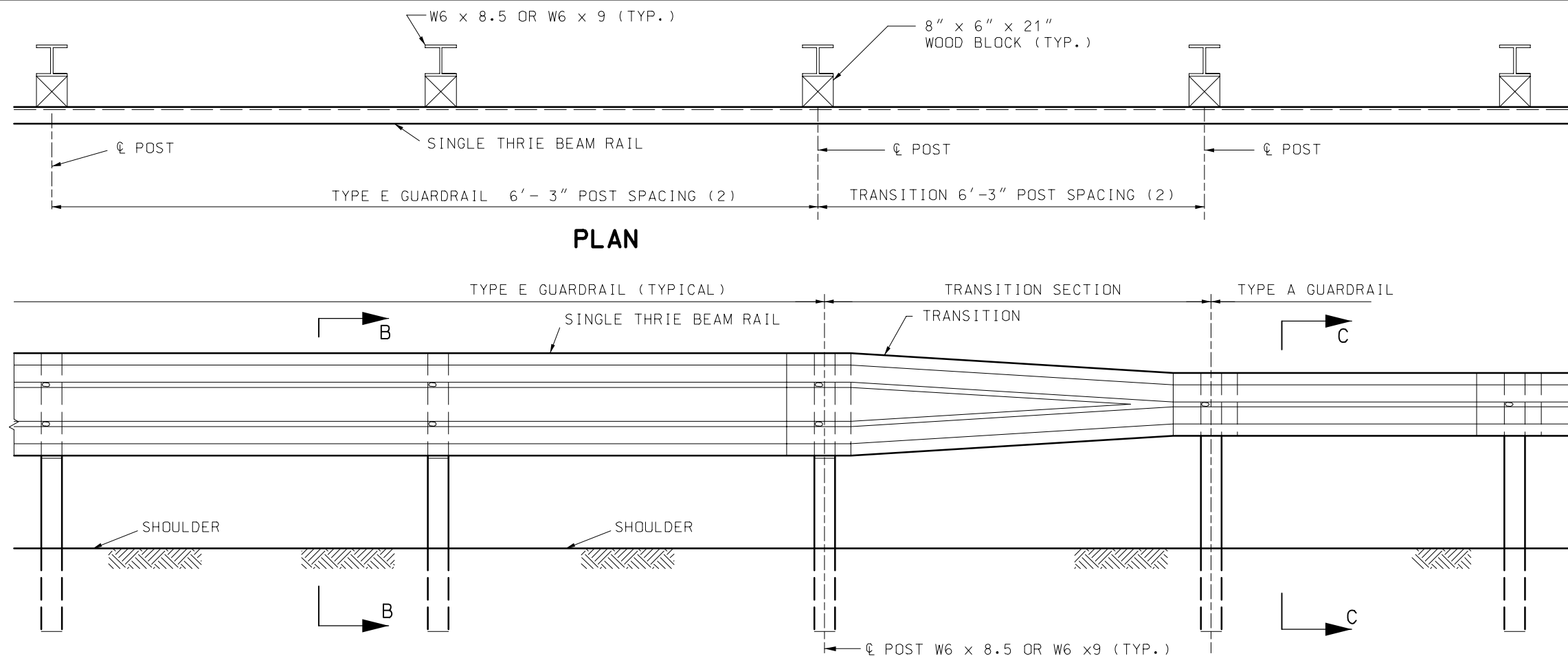
5/8" POST OR SPLICE BOLT  
OVAL SHOULDER SHALL BE OF ADEQUATE HEIGHT, LENGTH & SHAPE TO PREVENT TURNING DURING INSTALLATION OR REMOVAL OF BOLT.

NOTE: PORTIONS OF BEAM WITH UNUSED BOLT SLOTS TO BE LAPPED BEHIND.

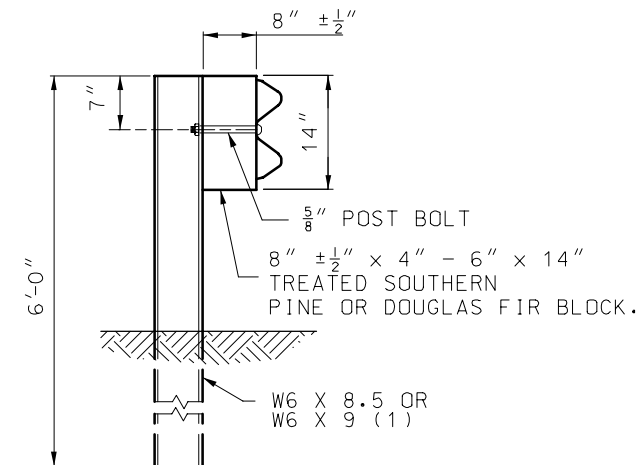


BEAM DETAILS SHOWING LOCATION OF ADDITIONAL BOLT SLOTS NECESSARY TO OBTAIN GUARDRAIL OFFSET.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
GUARDRAIL			
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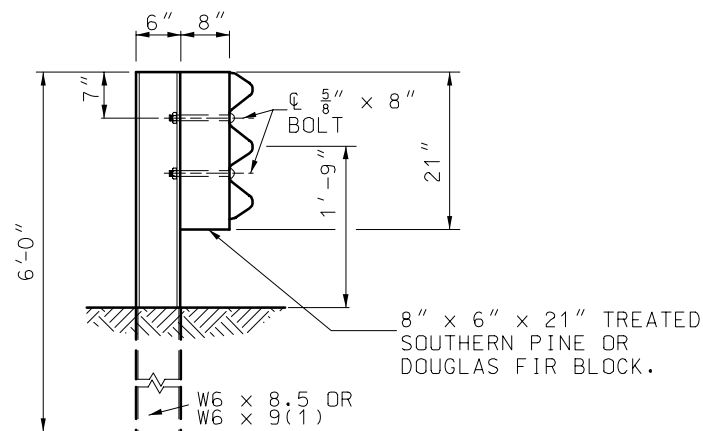
- (1) THE CONTRACTOR MAY FURNISH EQUIVALENT SECTIONS FABRICATED FROM MATERIAL MEETING AND IN ACCORDANCE WITH SECTION 1040.
- (2) IF THE TRANSITION IS CONNECTED TO A BRIDGE ANCHOR SECTION, POST SPACING FOR TYPE E GUARDRAIL AND THE TRANSITION SECTION SHALL BE 3'-1 1/4". FOR ALL OTHER CASES, POST SPACING SHALL BE 6'-3".



**SECTION C-C  
FOR WOOD BLOCKS**

**PART SECTION SHOWING TYPE E TO TYPE A GUARDRAIL TRANSITION**

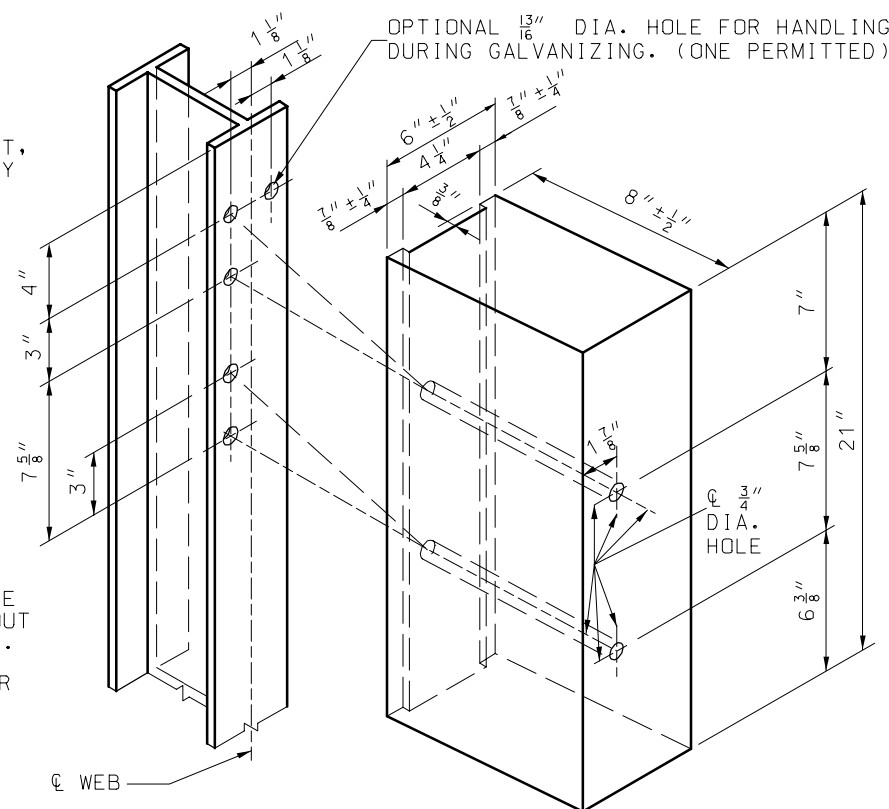
THE OVERALL NOMINAL DIMENSIONS SHOWN SHALL BE MET, ALTHOUGH THE SHAPE OF THE PLASTIC BLOCKS MAY VARY FROM THE SHAPE SHOWN, EXCEPT THE 7/8" ± 1/4" FLANGE AND THE OVERALL WIDTH DIMENSIONS MAY BE WAIVED IF APPROVED BY PROJECT OPERATIONS.



**SECTION B-B  
FOR WOOD BLOCKS**

NOTE: BLOCKS SHALL BE THE SAME TYPE THROUGHOUT THE PROJECT LIMITS.

ALL HOLES 13/16" DIAMETER EXCEPT AS NOTED



**HOLE PUNCHING DETAIL  
FOR STEEL POST & WOOD OR PLASTIC BLOCKS**

**GENERAL NOTES:**

TYPE E GUARDRAIL SHALL USE 6'-3" POST SPACING UNLESS 3'-1 1/2" POST IS SPECIFIED.

THE THRIE BEAM RAIL FOR THE TYPE E GUARDRAIL AND THE TRANSITION SECTION SHALL BE MADE OF STEEL AND SHALL BE 12 GAUGE.

FOR PROTECTIVE COATING AND MATERIAL REQUIREMENTS, SEE SECTION 1040 OF THE STANDARD SPECIFICATIONS.

SEE SHEET 3 OF 13 FOR REQUIREMENTS FOR SETTING POSTS AT OBSTRUCTIONS.

ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE SHOWN.

FOR DETAILS NOT SHOWN, SEE OTHER SHEETS OF THIS DRAWING.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

**GUARDRAIL  
TYPE E**

DATE: \_\_\_\_\_

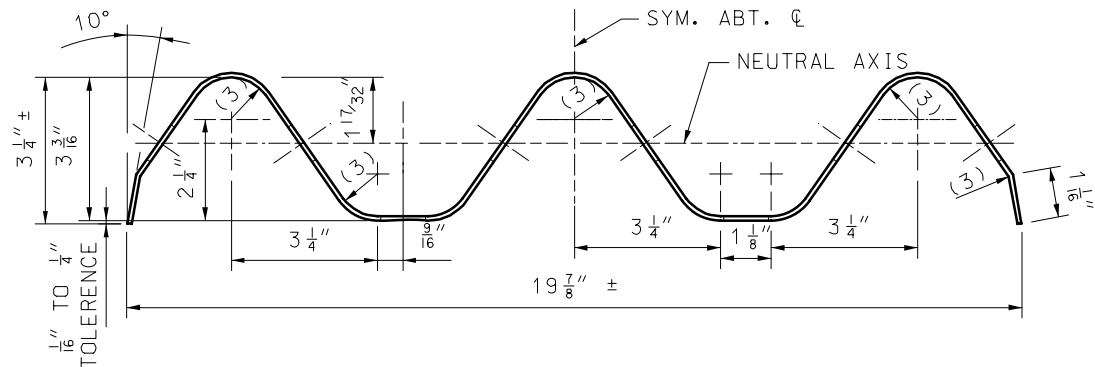
EFFECTIVE: 06-01-2006

**606.00AS**

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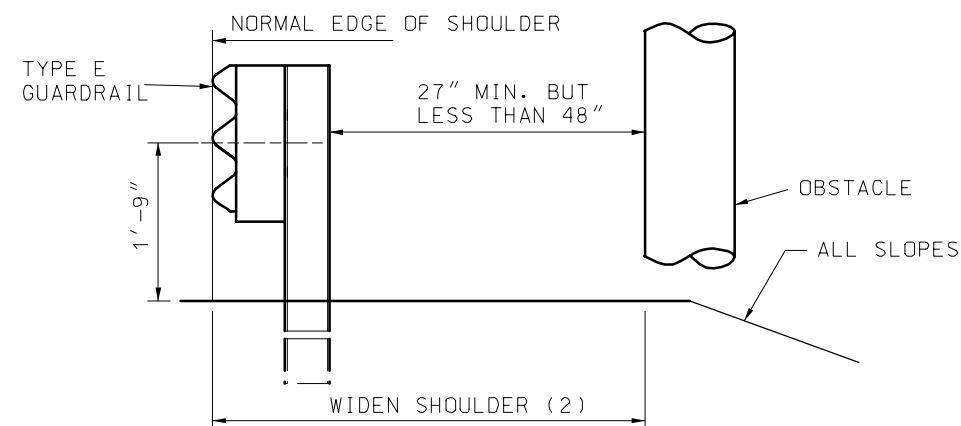
17





SECTION THRU THRIE BEAM RAIL

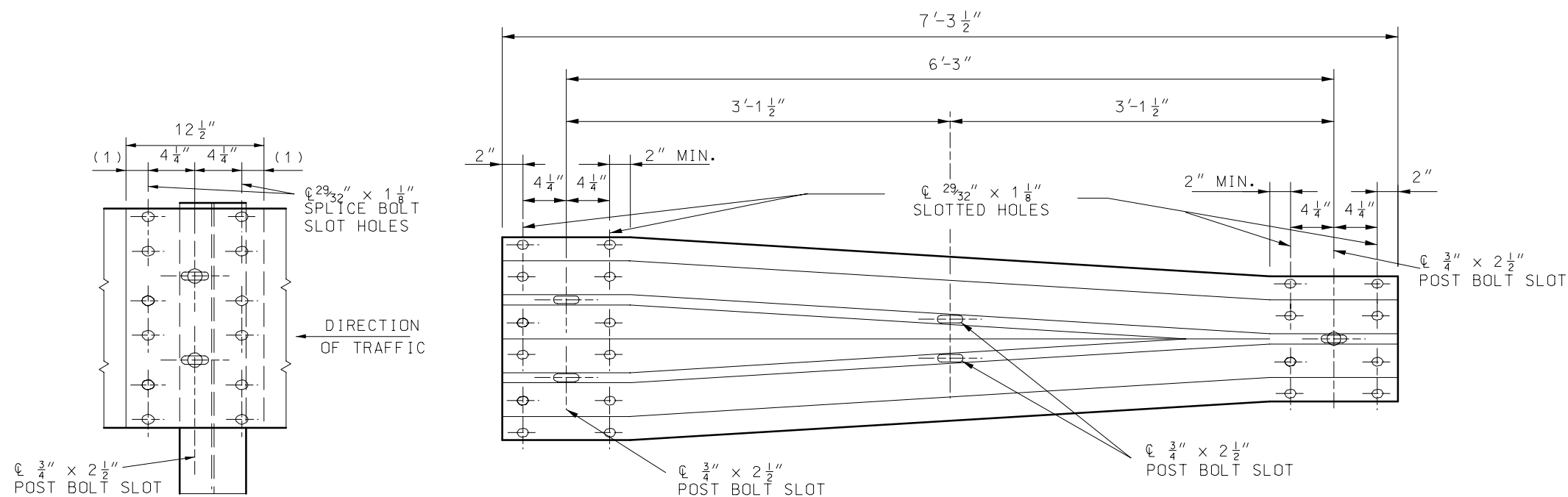
- (1) 2" (TOLERANCE  $+1\frac{1}{4}"$ ,  $-1\frac{1}{4}"$ )
- (2) SHOULDER WIDENING SHALL CONSIST OF EMBANKMENT MATERIAL COMPACTED IN ACCORDANCE WITH SETION 203.4 OF STANDARD SPECIFICATION.
- (3)  $\frac{15}{16}"$  RADIUS



SHOULDER ENCOACHMENT WILL BE PERMITTED TO OBTAIN MINIMUM CLEARANCE AT EXISTING OBSTACLES. A 50:1 TAPER SHALL BE USED FROM THE NORMAL SHOULDER LINE LOCATION TO THE ENCROACHMENT LOCATION AND, IF GUARDRAIL IS CONTINOUS, BACK TO THE LOCATION.

USE 25 FEET OF TYPE E GUARDRAIL PRECEDING THE OBSTACLE, AND THROUGH THE LIMITS OF THE OBSTACLE WHEN THE ABOVE CONDITION EXISTS.

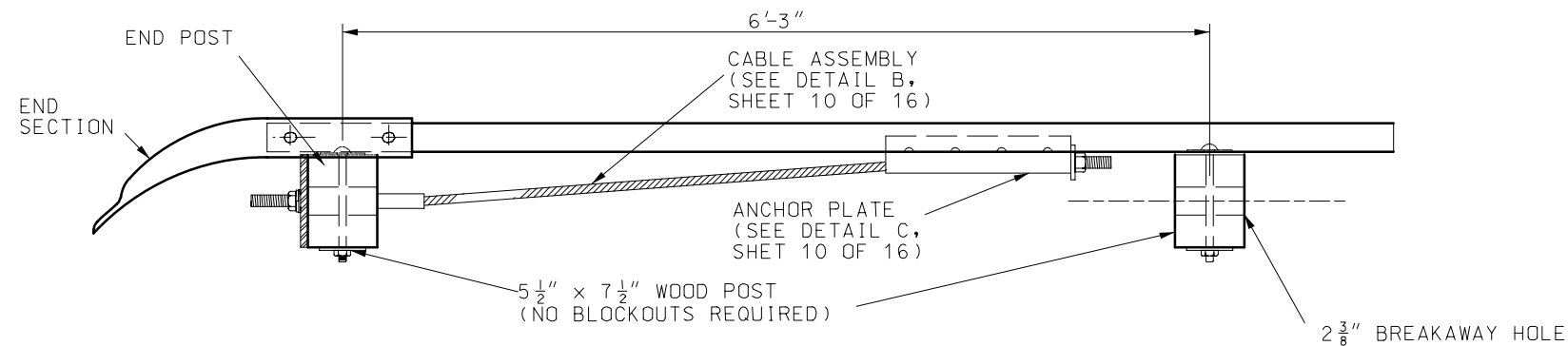
LATERAL PLACEMENT OF TYPE E GUARDRAIL



THRIE BEAM RAIL  
SPLICE AT POST

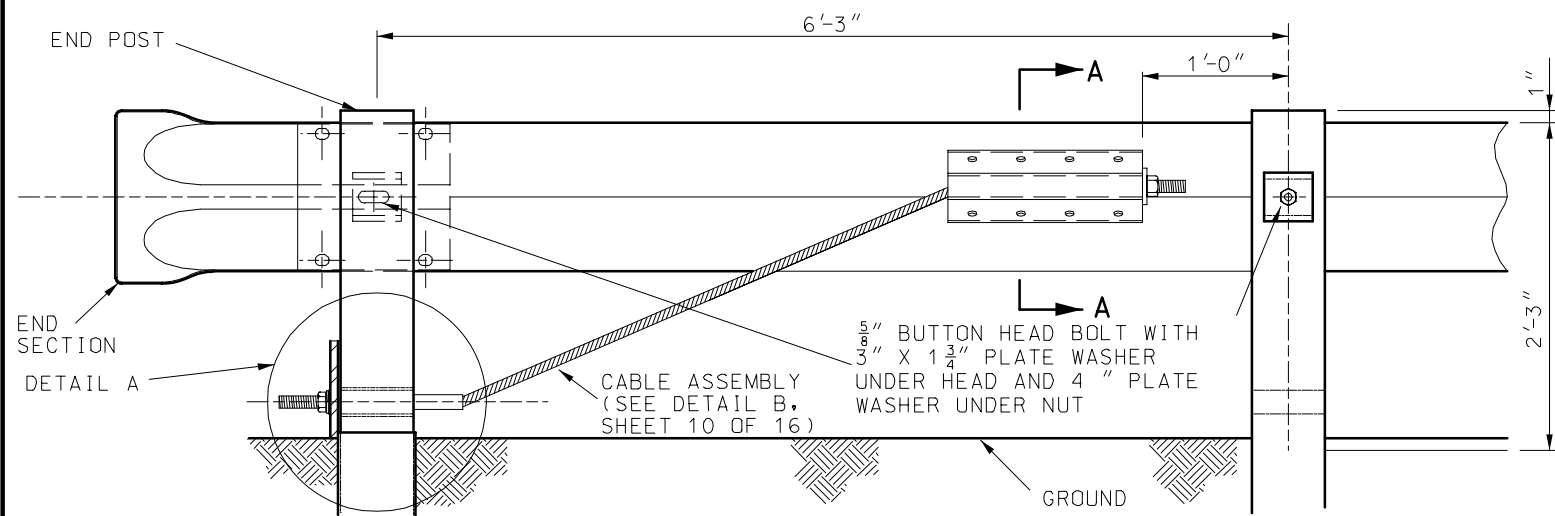
ELEVATION OF TRANSITION SECTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
<div>GUARDRAIL</div> <div>TYPE E</div>			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	9/17



NOTE: SEE SHEET 6 OF 16 FOR  
DETAILS OF END SECTION.

PLAN

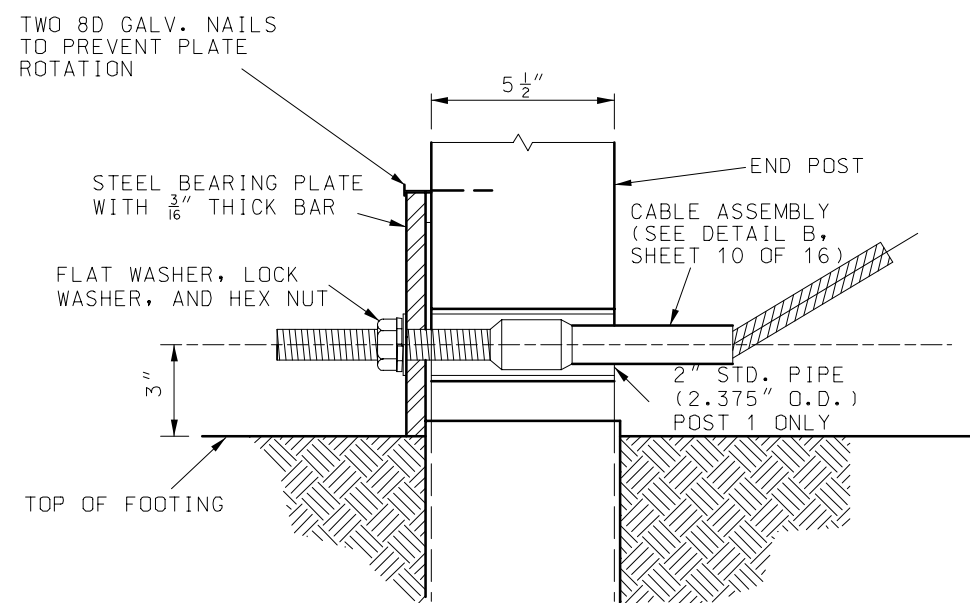


POST 1

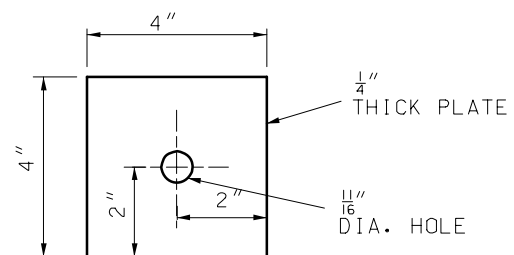
ELEVATION  
(BACK SIDE)

POST 2

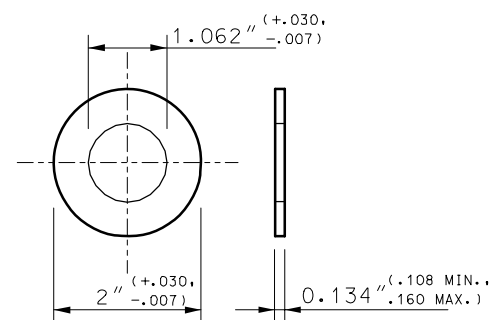
END ANCHOR DETAILS



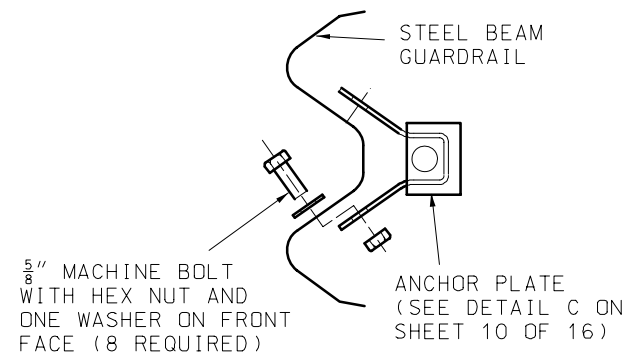
DETAIL A  
(END POST DETAIL)



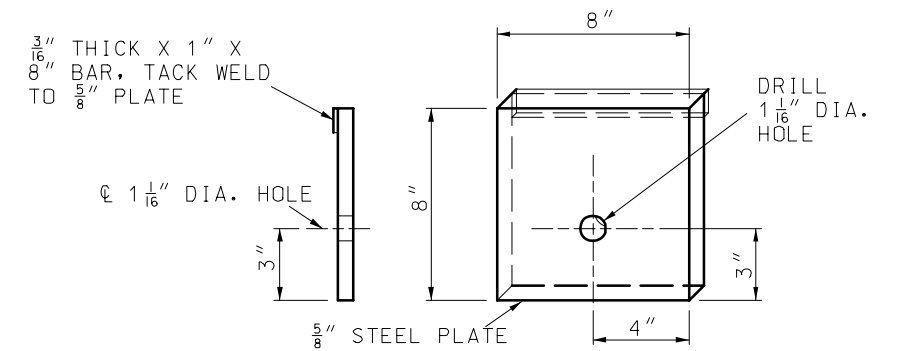
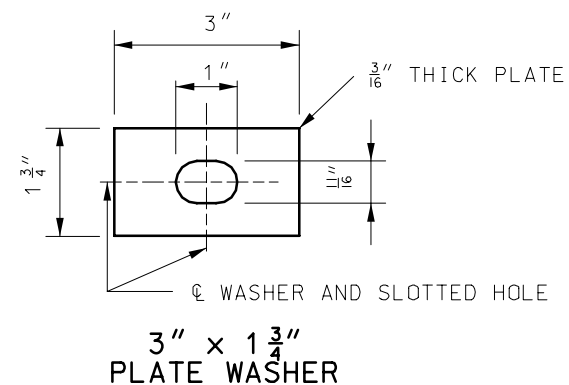
4" PLATE WASHER



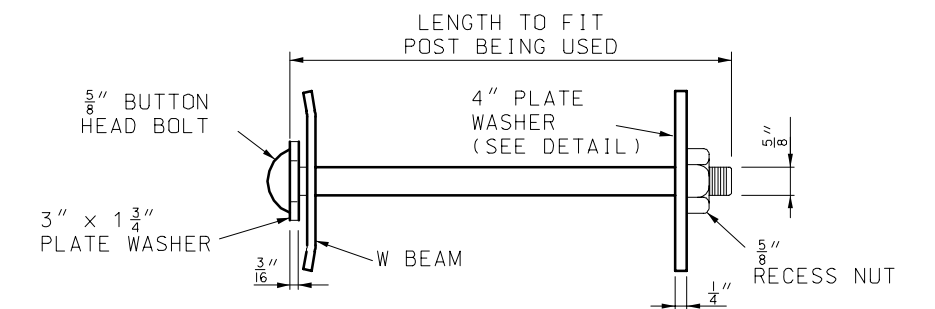
TYPE A WASHER



SECTION A-A



DETAIL OF  
STEEL BEARING PLATE



POST BOLT ASSEMBLY

#### GENERAL NOTES:

END ANCHOR DETAILS SHOWN SHALL BE USED ONLY ON  
DOWN STREAM ENDS OF GUARDRAIL WHEN AN END ANCHOR  
IS REQUIRED.

THE DETAILS SHOWN ARE FOR AN END ANCHORAGE SYSTEM  
FOR GUARDRAIL. GUARDRAIL AND POSTS ARE PAID FOR  
SEPARATELY.

CABLE ASSEMBLY AND ANCHOR PLATE SHALL BE SUBJECT TO  
APPROVAL BY THE ENGINEER AND SHALL HAVE A MINIMUM  
BREAKING STRENGTH OF 20 TONS.

ALL FITTINGS AND HARDWARE REQUIRED SHALL BE  
GALVANIZED AFTER FABRICATION, SEE SECTION 1040  
STANDARD SPECIFICATION.

WOOD POSTS 1 AND 2 SHALL BE 5 1/2" X 7 1/2".

SEE SECTION 1050 STANDARD SPECIFICATIONS FOR WOOD  
POST.

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

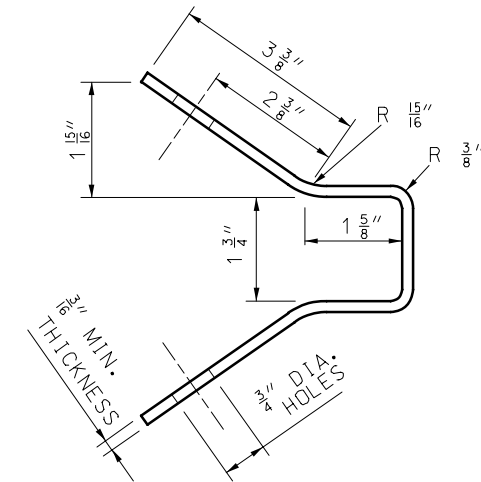
### GUARDRAIL END ANCHOR DETAILS

DATE: \_\_\_\_\_

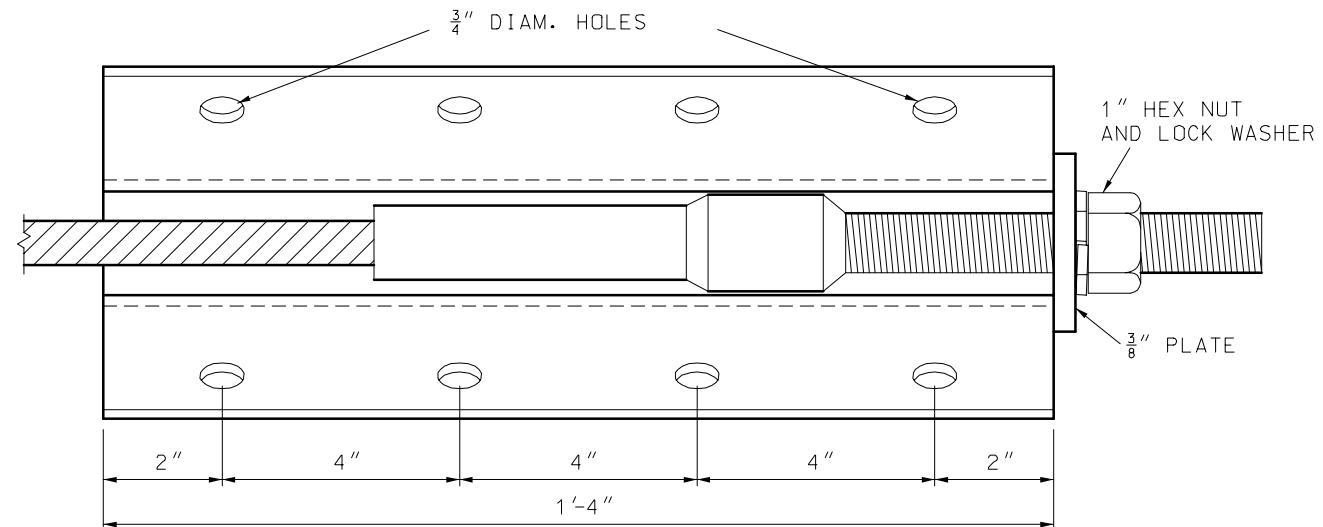
EFFECTIVE: 06-01-2006

606.00AS

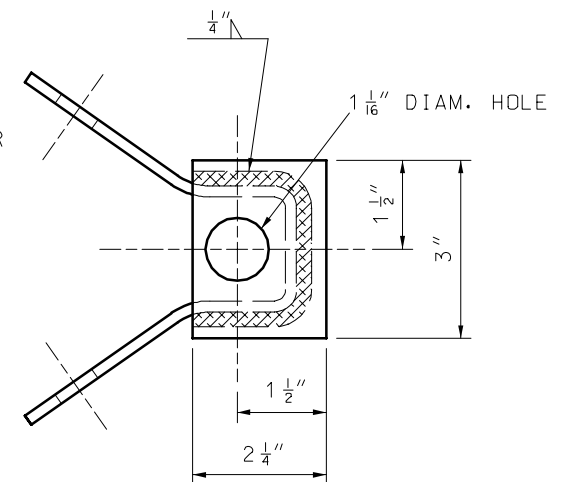
10  
17



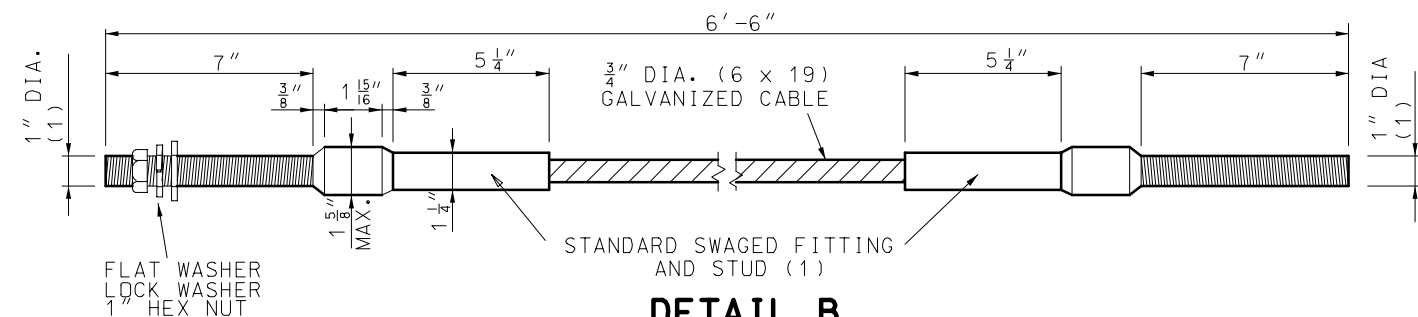
FABRICATION DETAIL



DETAIL C  
ASSEMBLED VIEW  
(ANCHOR PLATE)

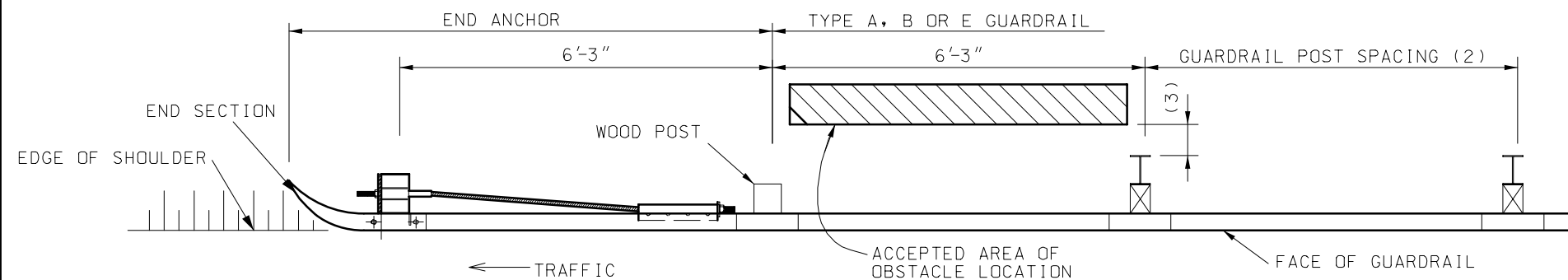


END VIEW

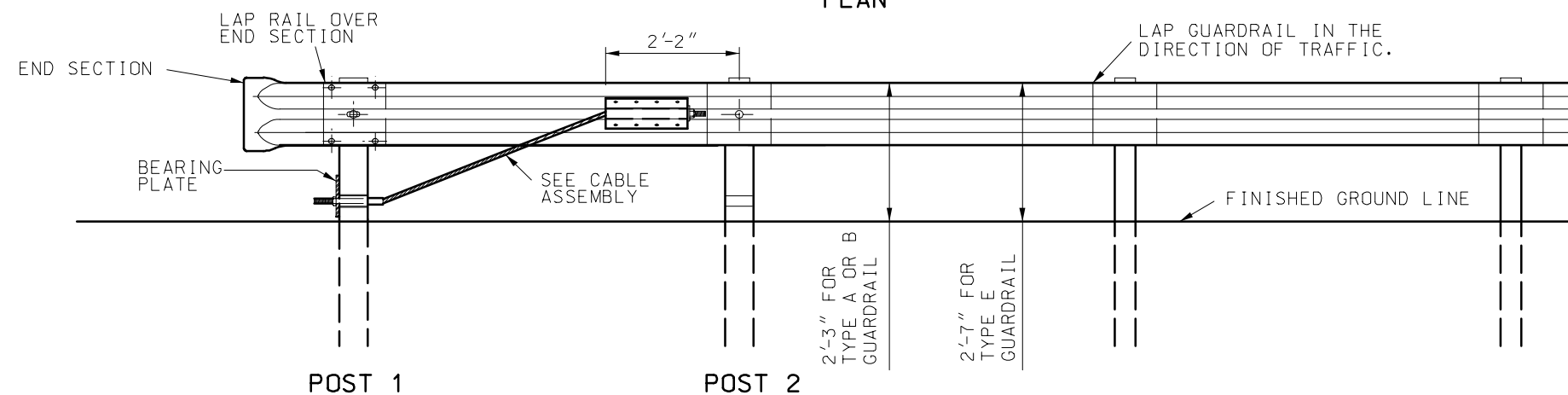


DETAIL B  
(CABLE ASSEMBLY)

- (1) STUD, THREADED ENTIRE LENGTH.
- (2) 6'-3" SPACING FOR TYPE A OR B GUARDRAIL; 3'-1 1/2" SPACING FOR TYPE E GUARDRAIL.
- (3) 27" MINIMUM BUT LESS THAN 4' FOR TYPE E GUARDRAIL; 4' MINIMUM FOR TYPE A GUARDRAIL.

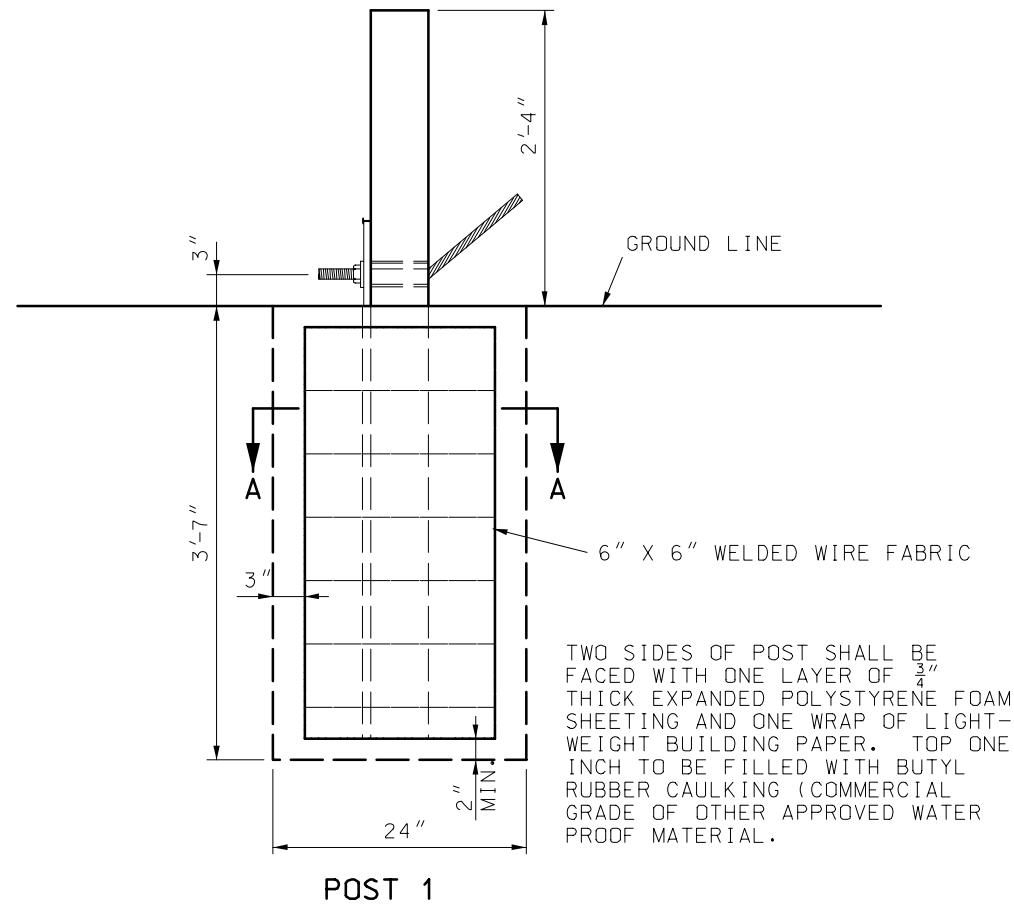


PLAN

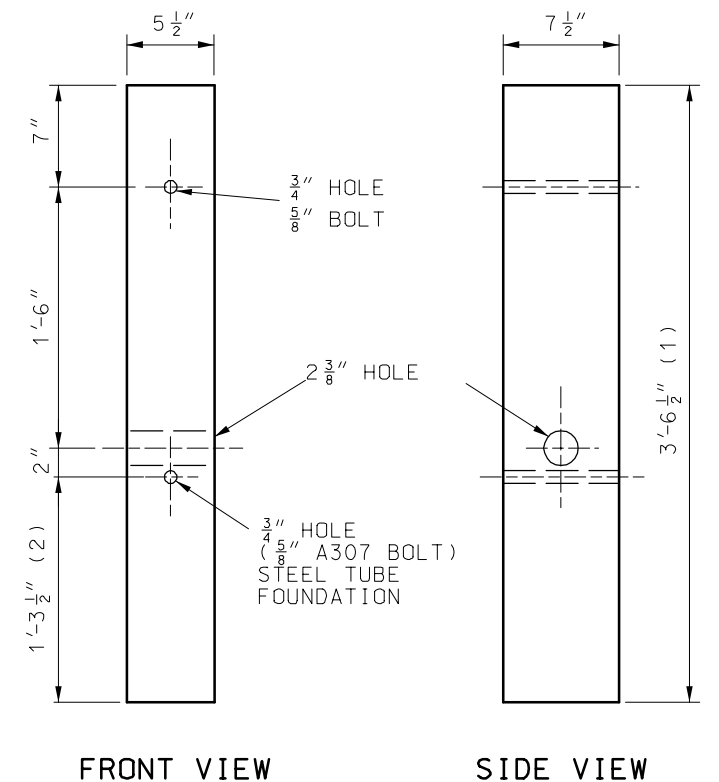
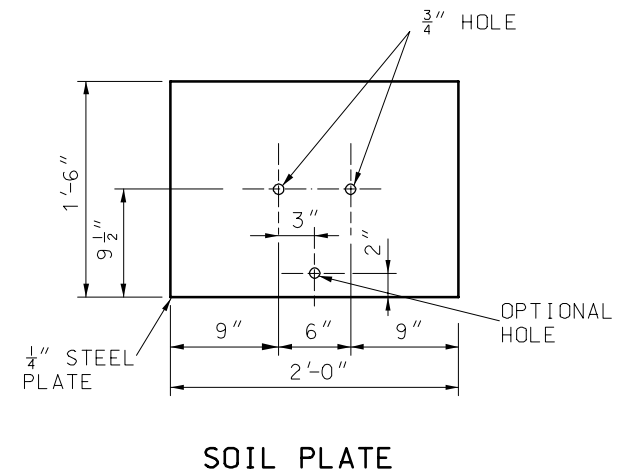
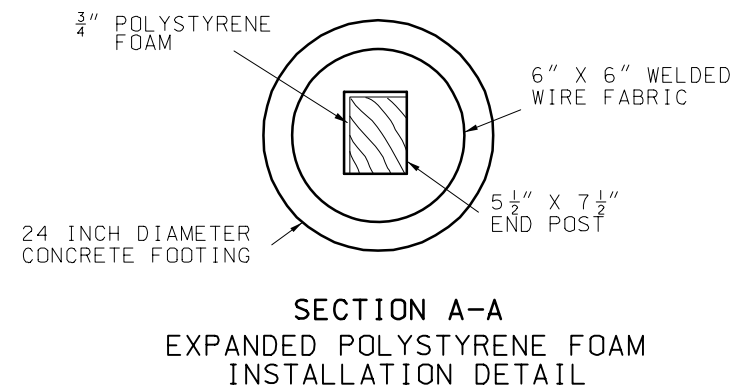


ELEVATION  
END ANCHOR

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
GUARDRAIL END ANCHOR DETAILS			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	11 17

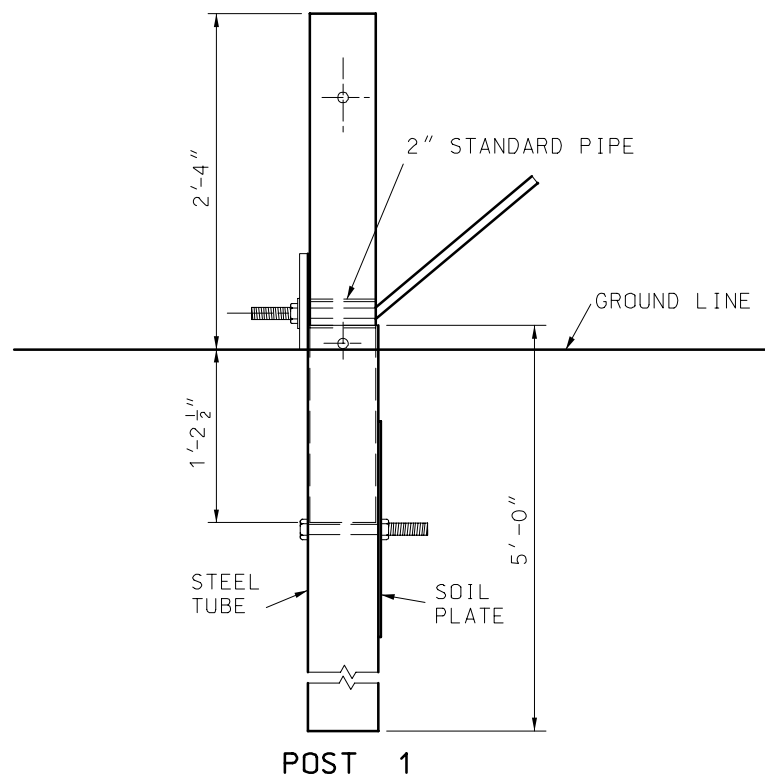


CONCRETE FOUNDATION FOR END ANCHORS

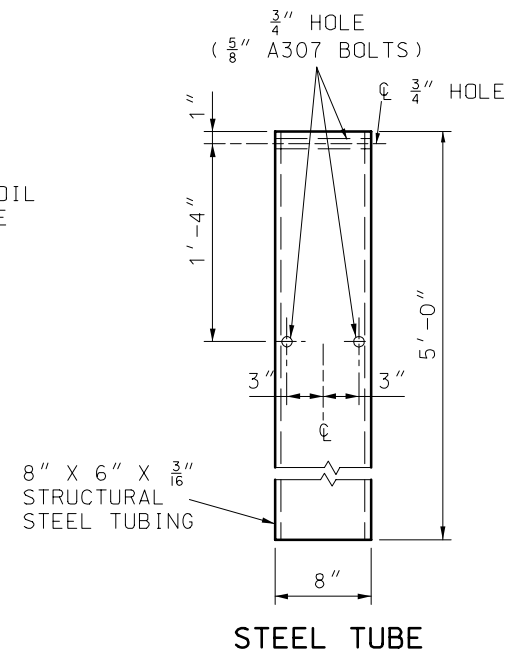
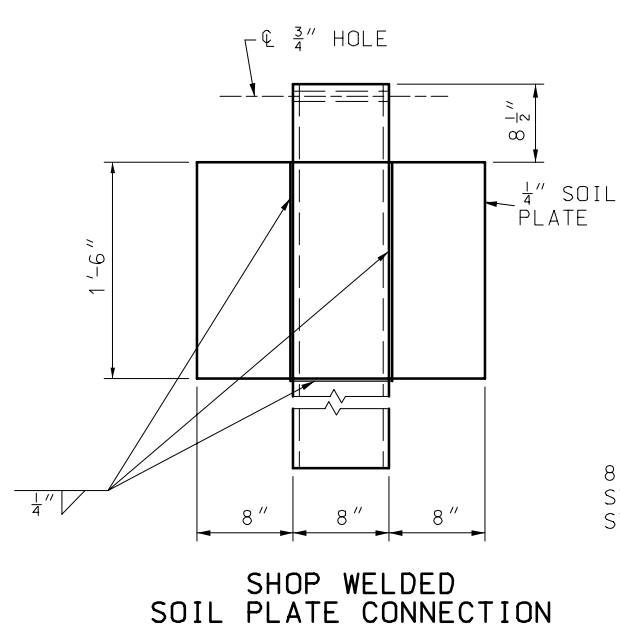


WOOD BREAKAWAY POST  
SEE SECTION 1050

- (1) 5'-9 1/2" FOR CONCRETE FOUNDATION ALTERNATE.
- (2) 3'-6 1/2" FOR CONCRETE FOUNDATION ALTERNATE.



STEEL TUBE FOUNDATION FOR END ANCHORS



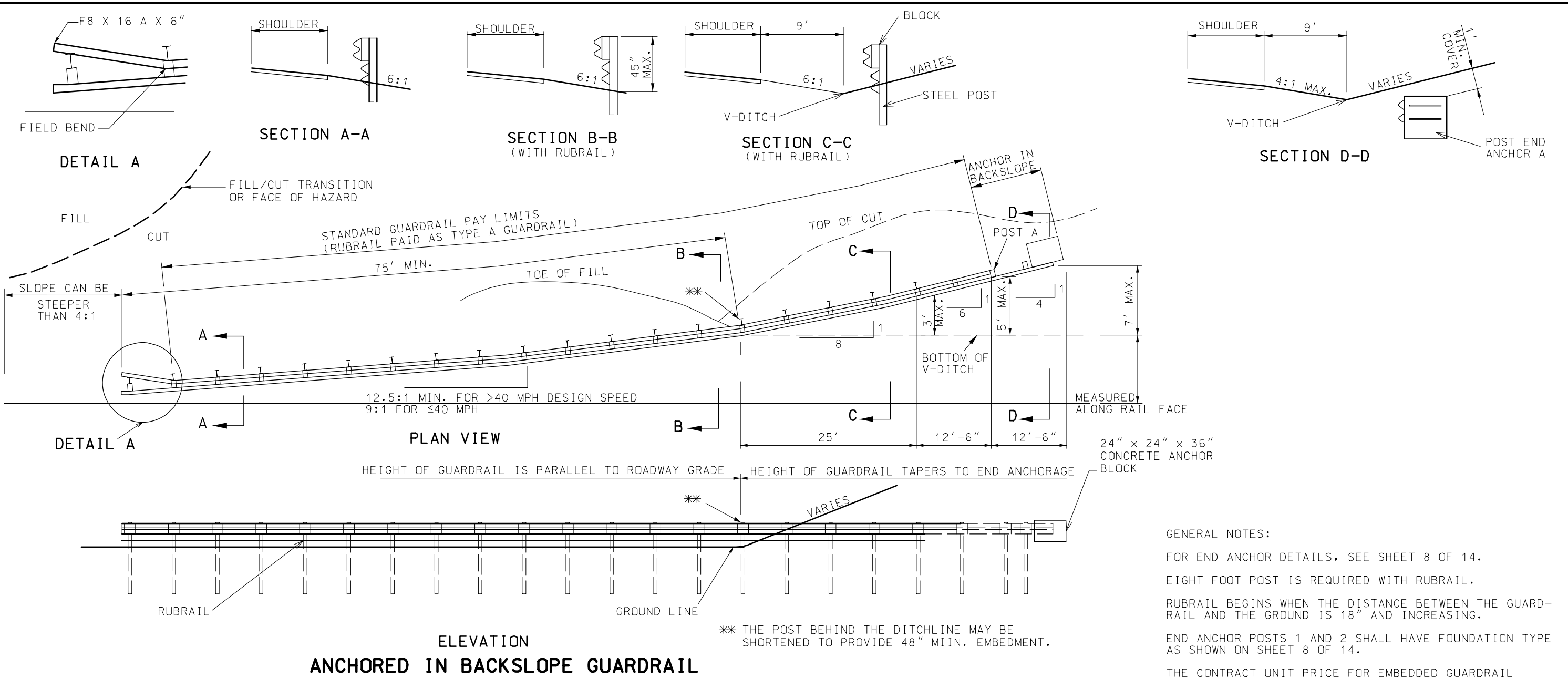
GENERAL NOTES:

THE CONTRACTOR HAS THE OPTION TO INSTALL WOOD POST 1 AND 2 IN STEEL TUBE OR CONCRETE FOUNDATION.

TRIMMING OF WOOD POST MAY BE NECESSARY FOR STEEL TUBE FOUNDATION.

STEEL TUBE FOUNDATIONS SHALL BE DRILLED AND BACK-FILLED WITH A SUITABLE MATERIAL WHEN THE SOIL PLATE IS BOLTED, AS SHOWN, TO THE STEEL TUBE. STEEL TUBE FOUNDATION MAY BE DRIVEN WHEN THE SOIL PLATE IS WELDED, AS SHOWN, TO THE STEEL TUBE.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
GUARDRAIL			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	12/17



GENERAL NOTES:

FOR END ANCHOR DETAILS, SEE SHEET 8 OF 14.

EIGHT FOOT POST IS REQUIRED WITH RUBRAIL.

RUBRAIL BEGINS WHEN THE DISTANCE BETWEEN THE GUARDRAIL AND THE GROUND IS 18" AND INCREASING.

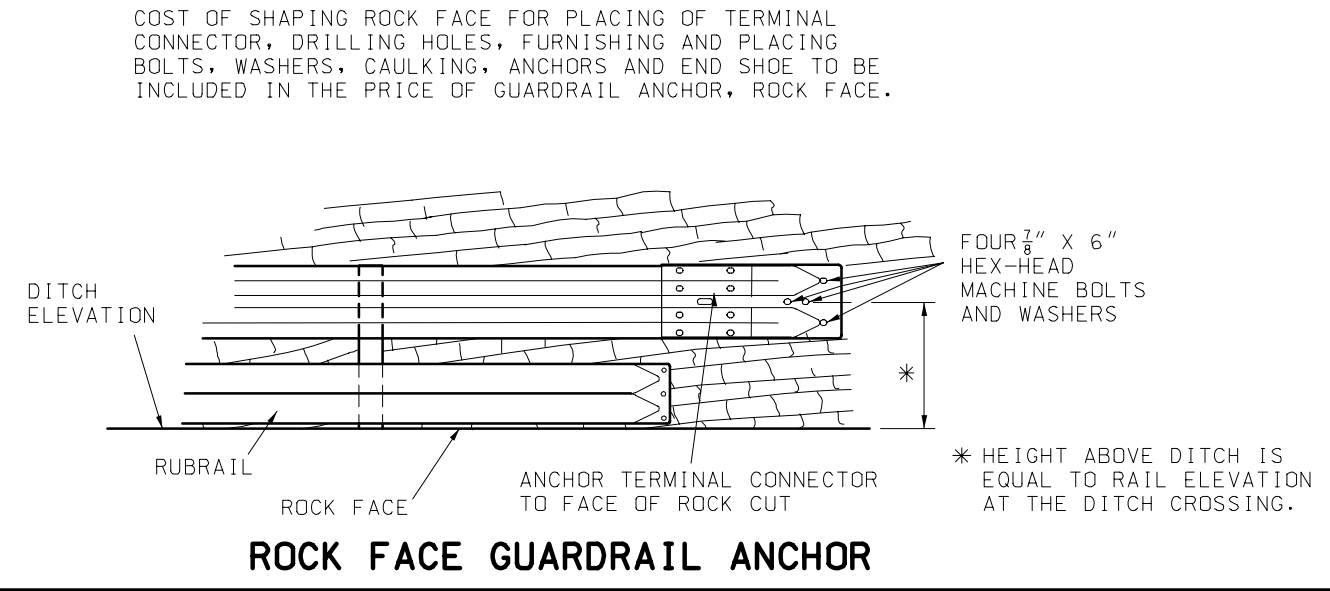
END ANCHOR POSTS 1 AND 2 SHALL HAVE FOUNDATION TYPE AS SHOWN ON SHEET 8 OF 14.

THE CONTRACT UNIT PRICE FOR EMBEDDED GUARDRAIL ANCHOR SHALL INCLUDE THE CONCRETE ANCHOR, EXCAVATION AND BACKFILLING, OR TERMINAL CONNECTOR, AND ALL INCIDENTAL HARDWARE AND WORK NECESSARY TO COMPLETE THE INSTALLATION.

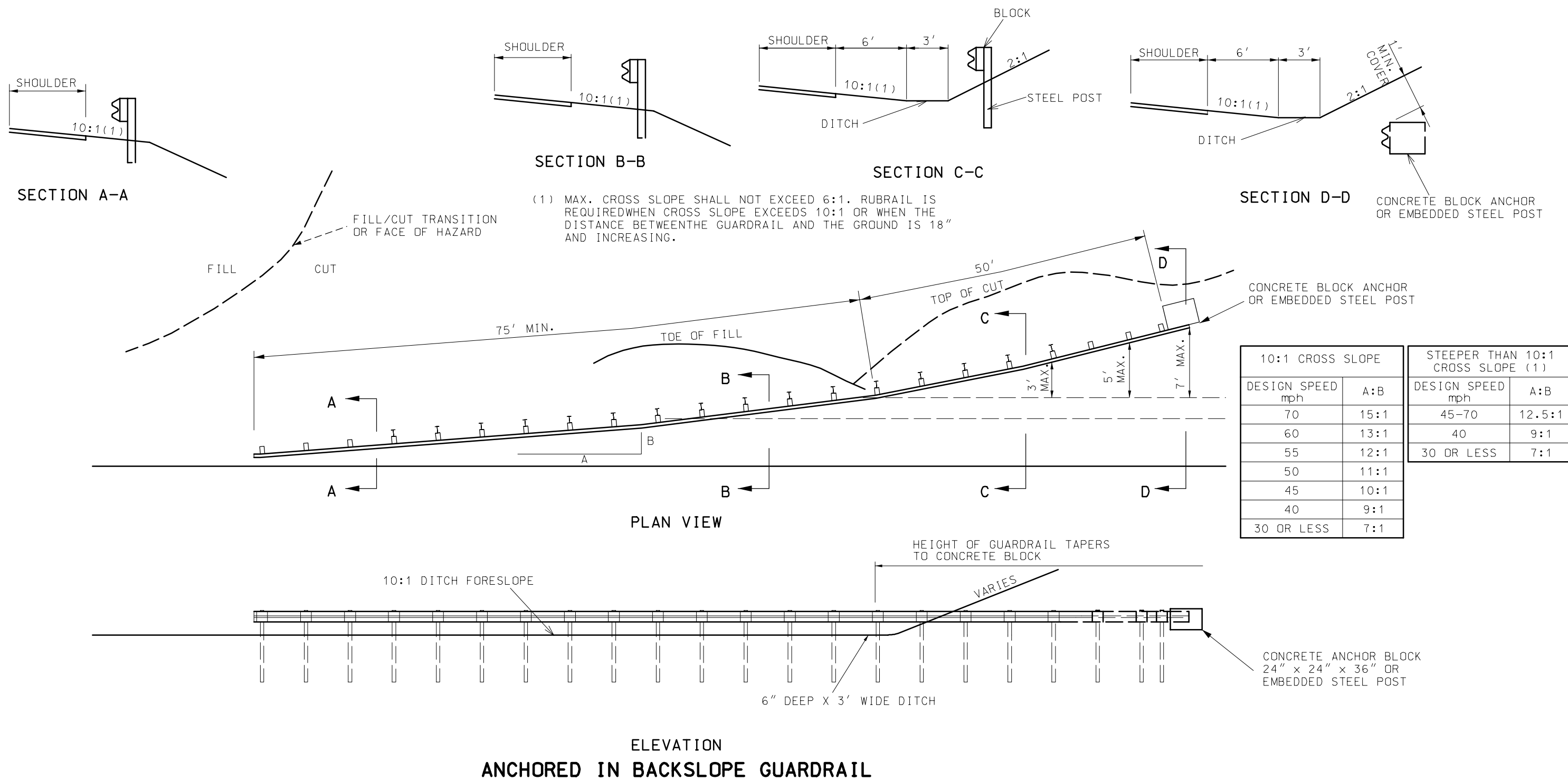
THE GUARDRAIL SHALL EXTEND 50' ± BEYOND THE DITCH LINE AND TERMINATE A MINIMUM OF 12 INCHES BELOW GROUND ELEVATION OF THE BACKSLOPE.

BLOCKOUTS WILL NOT BE REQUIRED FOR ANY POST WHICH WILL BE COMPLETELY BELOW GROUND. THE ALIGNMENT OF SUCH POSTS SHALL BE APPROVED BY THE ENGINEER.

SEE OTHER DRAWINGS AND STANDARD SPECIFICATIONS FOR MATERIAL AND CONSTRUCTION REQUIREMENTS NOT SHOWN.

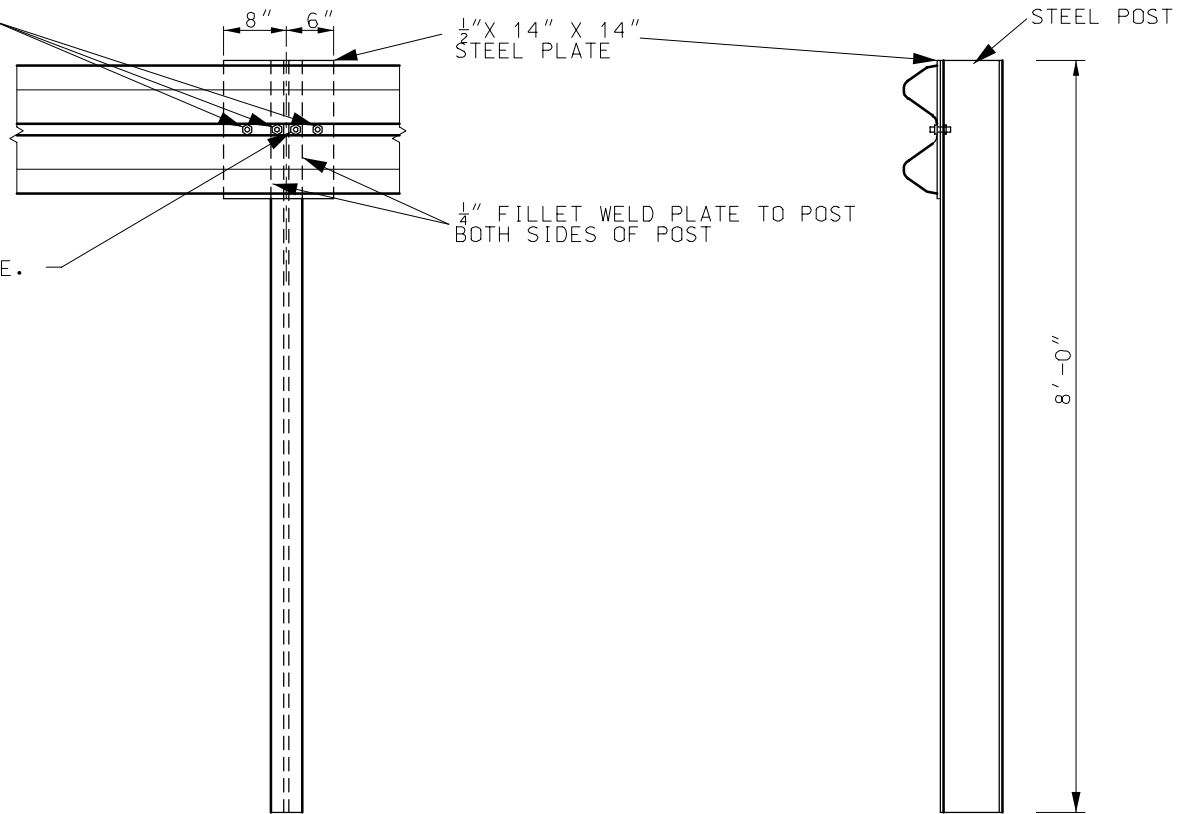


MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
<b>GUARDRAIL</b> ANCHOR IN BACKSLOPE WITH V-DITCH STEEPER THAN 10:1, 4:1 MAX. FORESLOPE			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	13/17



3 - 1" Ø HOLES TO BE FIELD DRILLED IN W-BEAM ELEMENT AND ATTACHED WITH 7/8" Ø HEX HEAD BOLTS 1 7/16" LONG EACH WITH ONE SQUARE WASHER AND HEX NUT.

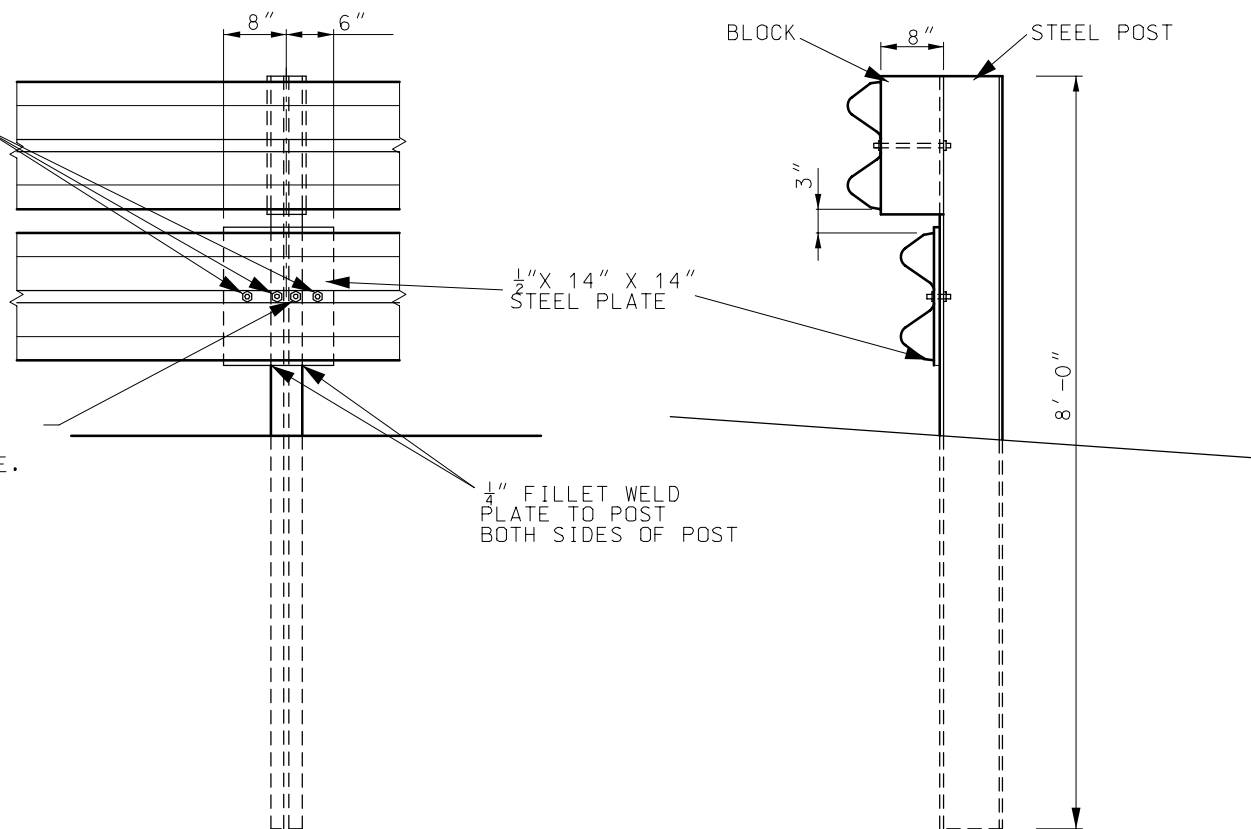
1" Ø HOLE TO BE FIELD DRILLED THROUGH W-BEAM AND THROUGH POST FLANGE. ATTACHED W-BEAM WITH 7/8" Ø HEX HEAD BOLT 2" LONG WITH ONE SQUARE WASHER AND HEX NUT.



EMBEDDED STEEL POST

3 - 1" Ø HOLES TO BE FIELD DRILLED IN W-BEAM ELEMENT AND ATTACHED WITH 7/8" Ø HEX HEAD BOLTS 1 7/16" LONG EACH WITH ONE SQUARE WASHER AND HEX NUT.

1" Ø HOLE TO BE FIELD DRILLED THROUGH W-BEAM AND THROUGH POST FLANGE. ATTACHED W-BEAM WITH 7/8" Ø HEX HEAD BOLT 2" LONG WITH ONE SQUARE WASHER AND HEX NUT.



SPECIAL RUBRAIL TO POST CONNECTION AT POST A

MISSOURI HIGHWAYS AND TRANSPORTATION  
COMMISSION

**GUARDRAIL**  
ANCHORED IN BACKSLOPE  
END ANCHORAGE DETAILS  
EMBEDDED STEEL POST OPTION

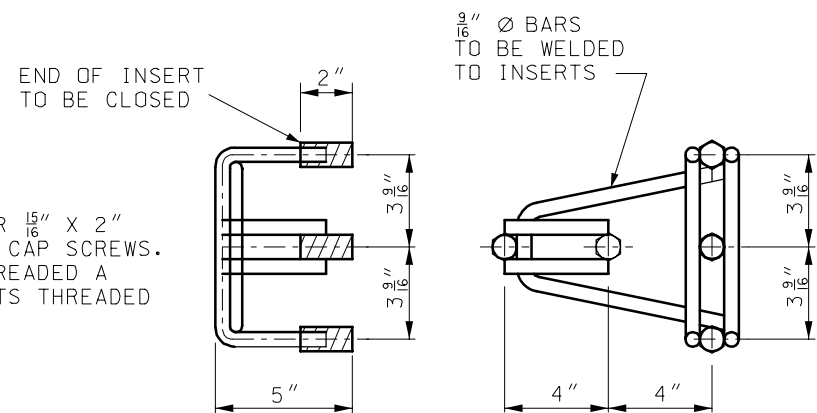
DATE: \_\_\_\_\_

EFFECTIVE: 06-01-2006

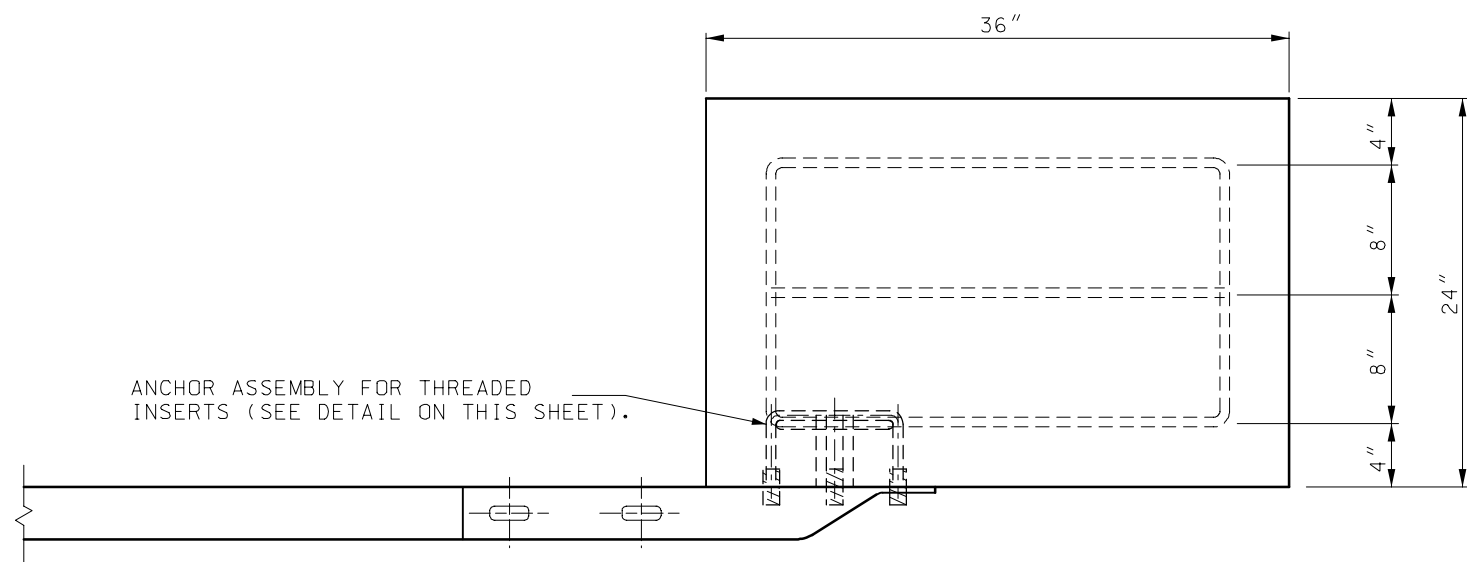
**606.00AS**

15  
17

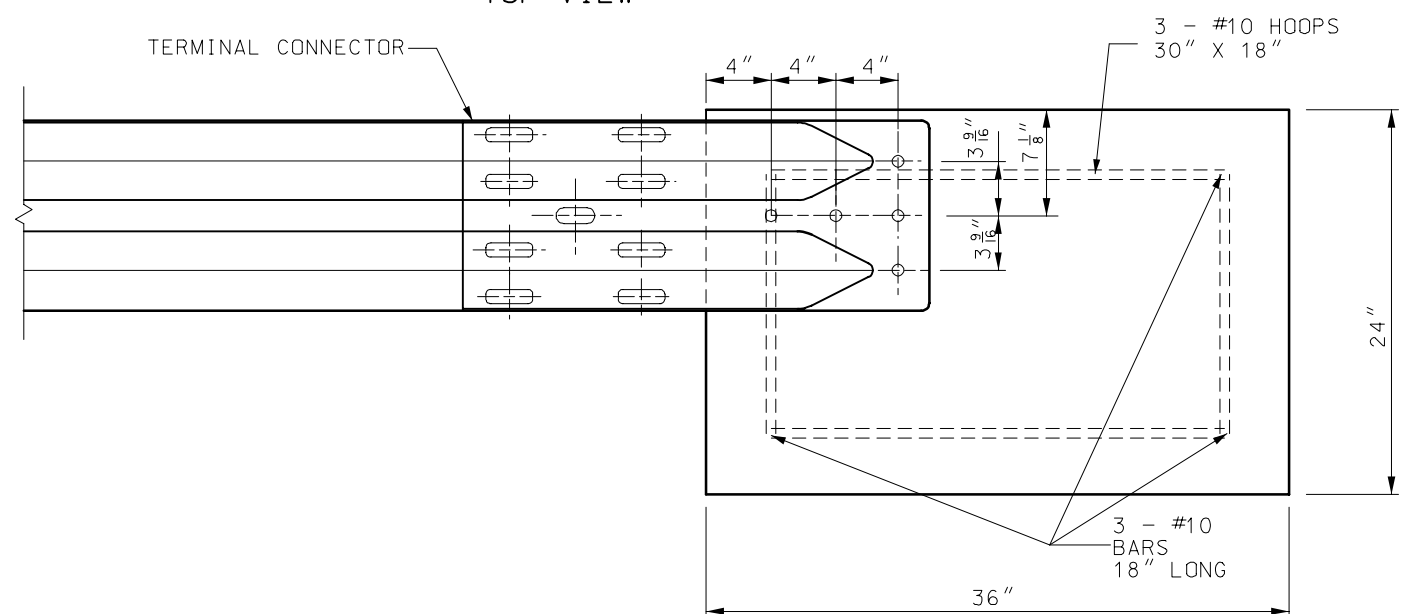
THREADED INSERTS FOR  $\frac{15}{16}$ " X 2" GALVANIZED HEX HEAD CAP SCREWS. CAP SCREWS TO BE THREADED A MINIMUM  $1\frac{7}{8}$ ". INSERTS THREADED MINIMUM OF  $1\frac{3}{4}$ ".



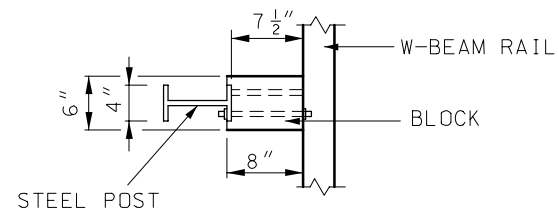
**CONCRETE BLOCK ANCHOR  
ANCHOR ASSEMBLY**



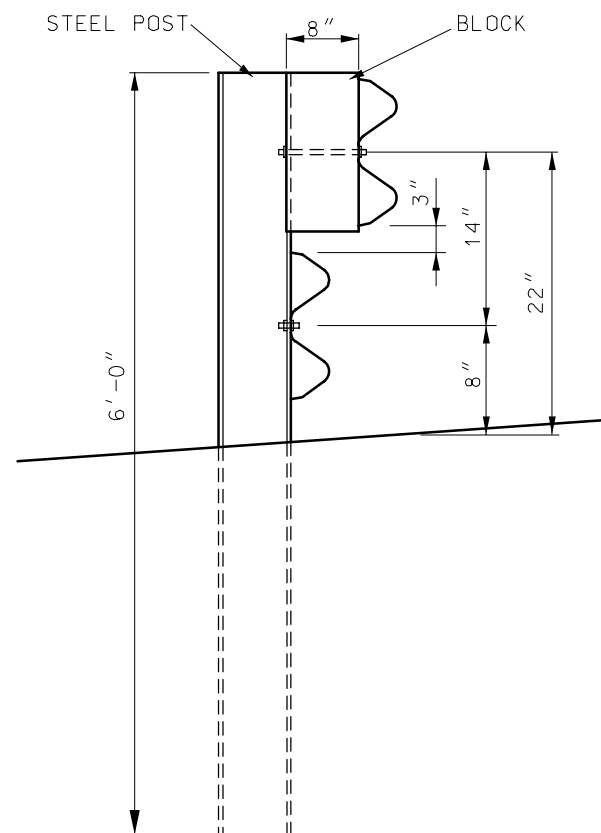
**TOP VIEW**



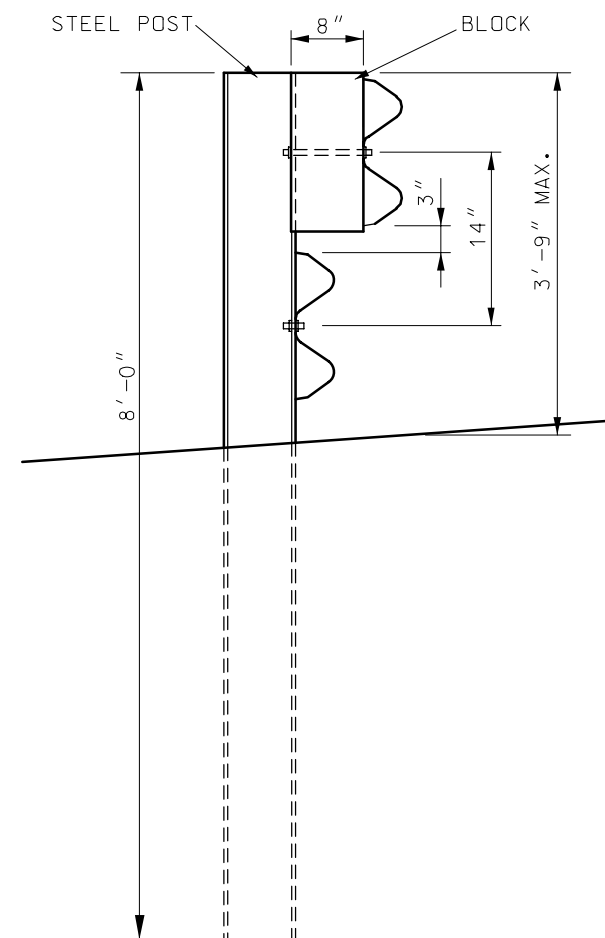
**ELEVATION  
CONCRETE BLOCK ANCHOR  
(24" X 24" X 36")**



**PLAN**

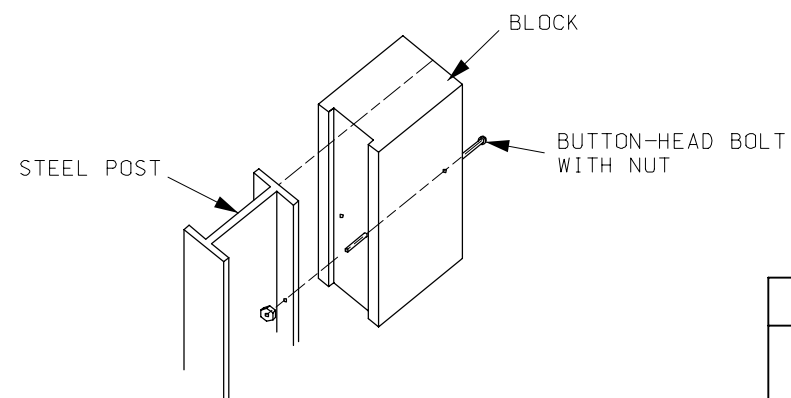


**ELEVATION OF 6' POST**



**ELEVATION 8' POST**

**STEEL POST AND BLOCK DETAIL**

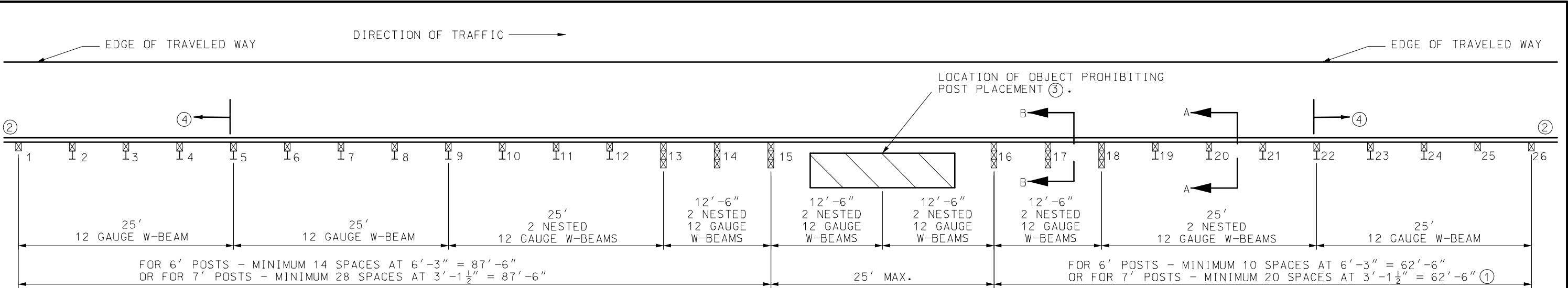


**EXPLODED VIEW**

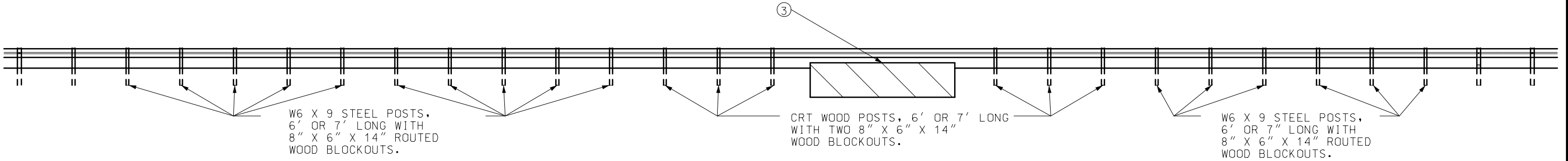
(RAIL AND WASHER NOT SHOWN)

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
<b>GUARDRAIL ANCHORED IN BACKSLOPE GENERAL DETAILS</b>			
DATE: _____	EFFECTIVE: 06-01-2006	606.00AS	16 17

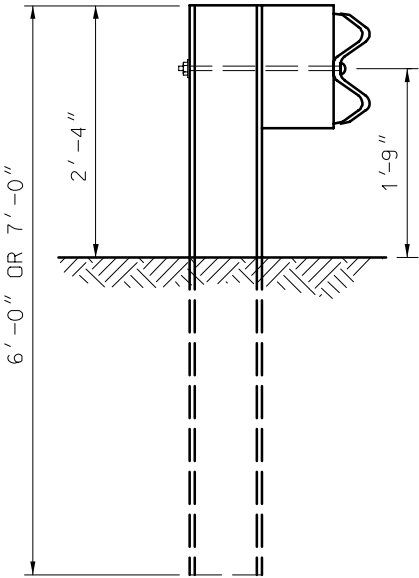




PLAN

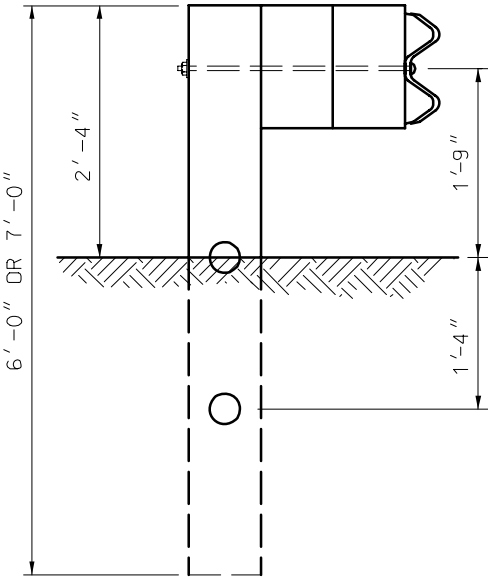


ELEVATION



SECTION A-A

W6 X 9 STEEL POSTS, 6' OR 7' LONG WITH 8" X 6" X 14" ROUTED WOOD BLOCKOUTS  
POSTS 3 THROUGH 12 AND 19 THROUGH 24.



SECTION B-B

CRT WOOD POSTS, 6' OR 7' LONG WITH TWO 8" X 6" X 14" WOOD BLOCKOUTS  
POSTS 13 THROUGH 18.

- ① IF LOCATED WITHIN THE CLEAR ZONE OF A TWO-WAY ROADWAY, THE MINIMUM LENGTH IS 87'-6".
- ② ADDITIONAL GUARDRAIL AS REQUIRED, INCLUDING END TREATMENT.
- ③ THE POST MAY BE SKIPPED DUE TO THE PRESENCE OF AN OBSTACLE SUCH AS A CULVERT.
- ④ PLACE END TREATMENT NO CLOSER TO THE SKIPPED POST THAN POSTS 5 AND 22.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION			
		<b>GUARDRAIL SKIPPING A POST (MODIFIED LONG-SPAN GUARDRAIL SYSTEM)</b>	
DATE: _____	EFFECTIVE: 06-01-2006	<b>606.00AS</b>	17 17